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# COMMON
# NATIVE INSECTS
OF
# SOUTH AUSTRALIA.

A POPULAR GUIDE TO SOUTH AUSTRALIAN ENTOMOLOGY.

BY

J. G. O. TEPPER, F.L.S.

## PART II.

## Lepidoptera, or Butterflies and Moths.

ADELAIDE:
Published by E. S. Wigg & Son, 14, Rundle Street, and 29, Ludgate Hill, London.
1890.

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# PREFACE.

In presenting the Second Part of the "Common Native Insect: Lepidoptera," it is to be noted that of the Butterflies and Hawk-moths as complete an account is given as was possible at the time of publication in the *Garden and Field*, to the editor of which the author is very much indebted for his assistance; as, however, but comparatively few of the Moths proper were identified, or could be described from specimens, the deficiency had to be supplied by compilation from previous works, principally Walker's Catalogue, so as to present a fairly systematic view of the Australian Lepidoptera serviceable as a first text book for Australian amateur collectors.

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## ERRATA AND CORRECTIONS.

Page 15.—Read “Chaerocampa Scrofa” for “C. pallicosta.”
“ 15.—Second column, line 19, insert “which resembles them, viz.: *Hecatesia thyridion*, Fish.” for “but have no specimen.”
“ 19.—Read “Apena” for “Apina.”
“ 20.—Read “N. amici” for “N. amica.”
“ 25.—Read “Damina” for “Damima.”
“ 31.—Dele “MOTH.”
“ 46.—Insert at end of first paragraph “(G. cyanopa, Meyr. in litt. E. Guest).”
“ 49.—Read “Toxocampidæ” for “Taxocampidæ.”
“ 49.—Dele “PYRALITES.”
“ 54.—Read “Gastrophora” for “Gastrophara.”
“ 55.—Two descriptions of Hypochroma given by mistake

# COMMON NATIVE INSECTS.

BY J. G. O. TEPPER, F.L.S.

## Part II.—LEPIDOPTERA, or BUTTERFLIES AND MOTHS.

### INTRODUCTION.

Perhaps there are not many persons who in their youth have not sometimes heartily enjoyed a chase after some brightly-coloured butterfly, or have not admired their graceful form, elegance of motion, and ever beautiful tinting, by which they have become the favourites of young and old, artists and poets, nay, even theology has appropriated them as emblems of the resurrection of the dead.

The Lepidoptera form an order so distinct from all others, and at the same time so similar in structure, that they approach that of some other but in very few cases, and are very rarely mistaken. The name of the order signifies "scale-winged," and is taken from one of their chief characteristics, viz., the covering of the whole or part of the surface of limbs and body by minute variously-shaped scales, which upon the skin-like transparent membrane of the wings are usually flat, and fixed by slender short stalk into its substance, while upon the body and legs they assume often the form of hairs, which are sometimes of considerable length and density. Both, but especially the wing-scales, are easily removed with a touch of the finger, hence the disappointment of many a young butterfly hunter, who finds after the capture only a dull raggetty "thing," instead of the gorgeously-coloured object that excited him to a chase for miles. These scales alone are coloured, and are of different form not only upon divers parts of the wings of the same species, but also vary with every kind, and are favourite objects with those who cultivate the study of the microscope.

The English-speaking people have a separate popular name for the three main divisions of the order, viz., Butterflies, Hawk-moths, and Moths, others denoting them by one collective term; but the distinction is by no means sufficiently precise for correct knowledge, as species of the one assume the aspect of the other.

The characteristics of the order are—Four ample, large, or very large wings (seldom partly or wholly abortive in one of the sexes, never in both), covered more or less completely by minute scales; mouth parts transformed into a long spiral proboscis for suction only, or in some cases quite aborted; and perfect metamorphosis. Any insect answering to the above—no matter what may be the size, colour, or general aspect—belongs to the order, which is very large, and constructed on so uniform a plan that, though usually easy to separate the various species, it is as difficult to define the genera, &c., by any sharp demarcations.

They, as all other insects, take their origin from eggs or ova, which are furnished with a hard shell, and which are placed by the female upon or near the plant serving as food to the offspring. This, in by far the majority of cases, is some plant or vegetable product; some, though, are devouring animal substances, such as wool, hair, cloth, &c. In a few weeks or months these ova hatch, and from them proceed larvæ of a more or less cylindrical form, and twelve segments, possessing mostly from 10 to 16 legs (never more), a few leaf-miners only being legless. The first three pairs are true legs, are jointed, and have claws; the remainder are not so, are fleshy, adhere by suction only, and are called *false* legs, the last pair being termed claspers.

The rounded head is furnished with strong jaws and other mouth parts, short antennæ, five or six ocelli or simple eyes, and a spinning organ on the lower lip. They breathe by means of nine pairs of stigmata, openings in the skin communicating with the trachea or air-tubes, and closed by valves. The surface is either smooth, roughened by tubercles or humps, or clothed by bristles or hairs of various forms and arrangement.

The colour varies according to their mode of life; those living in the interior of plants are pale, night-feeders dull, and those with diurnal habits either tinted so as to agree with their surroundings, concealing them from view of their enemies, or very conspicuously and brightly coloured. In the latter case they are protected by an acrid taste, their bright colours serving as a warning to birds, &c., that they are unfit for food. The colour of the *caterpillars*, as the larvæ of lepidoptera are called, usually bears no relation to that of the perfect insect, it being often very dissimilar in one stage with species closely agreeing in another. All caterpillars are more or less injurious, the degree of harm done depending upon their number and the substances attacked. In the perfect or *imago* state lepidoptera are harmless, living exclusively upon the nectar of flowers or other fluids. Some there are which take no food whatever. For instance, the large moths, whose larvæ riddle the wood of our eucalypts; their sole function is to pair, deposit their eggs, and then die.

Eating very voraciously, the caterpillars grow rapidly, the inner parts faster than the skin, below which another forms. The old one bursts finally over the thoracic or breast segments, which bear the true legs, and is cast off. This is called moulting, and is repeated several times. Before the last moulting the larva either hides in the ground, under bark, &c., or spins a more or less dense web around itself, formed of silky threads, either free or glued together, called a cocoon, and fixed to some support. That of most butterflies proper consists of a string fixing one extremity, and a belt securing it in the middle. Within this the skin is cast off, and a form assumed totally different from that of the larvæ, viz., that of the *pupa* or *chrysalis*, which is without any limbs, blunt at the extremity of the head and more or less pointed at the other. In this state they take no food, are quite inactive, and may be said to have assumed a second egg-state. Usually after some few days, weeks, or months, sometimes one or two years, the pupa becomes mature, bursts above, and the perfect insect struggles out of its hard case, fluttering its closely-folded wet wings, and breathing very rapidly it fills their air-vessels, they unfold, stiffen, and in a few minutes or hours bear away their wearer in rapid flight. The wings are formed by a transparent colourless skin, stiffened by what are called nervures or ribs, which are hollow, and through which circulates the colourless blood of the insects. By their different arrangement, number, form, &c., they serve to divide the lepidoptera into families and genera, in conjunction with the outline of the wings, form of body, shape of the antennæ, &c.; while the pattern of colours usually suffices to distinguish species. The nervures of the wings can always be examined at leisure without spoiling a specimen by moistening with benzine.

The two large eyes of the perfect insects are always compound—that is, consist of a great number (hundreds, often many thousands) of simple eyes crowded together. The antennæ are many-jointed, either ending in a club, as in all true butterflies, gradually thickened forward, as with the hawk-moths, or threadlike, as in most moths. Among the latter they are often saw or comb-like (serrated or pectinated) either in one or both sexes. They vary in length from much less than half the length of the body to much exceeding that of the whole.

The head of most lepidoptera is usually small, the eyes globular and prominent, all the mouth-parts (except one pair of feelers or maxillæ) united into a proboscis or sucking tube, spirally wound up when at rest, and concealed in a groove beneath; the maxillæ project forward in the form of two hairy points. The head is firmly joined to the breast-part.

The thorax or breast consists of three segments, firmly united into one mass, of which the first bears the first pair of legs, the second the large fore wings and middle legs, and the last is furnished with the hind wings and legs and the abdomen, which is attached by a very slender connective.

The abdomen consists of six or seven segments, the last never bearing any sting or other appendage, but in a few kinds that of the female is elongated, and can be withdrawn or pushed out at will, and is employed as an ovipositor, to place the eggs (sometimes exceedingly numerous) in the ground, or in cracks and crannies of the bark.

The legs are mostly weak, and, especially the hind legs, very slender. The feet or tarsi of the first pair are sometimes wanting; those of the others are composed of five joints, the last bearing a double claw.

The wings consist of a transparent colourless membrane, traversed by veins or ribs, the branching of which forms one of the principal characters, distinguishing families, &c. This is covered above and below by minute scales in most cases—(some genera have them either wholly or partially bare)—the colours of which are often very different on the upper and under side, and distinguish species usually. The wings vary greatly in form and size, and sometimes fold lengthwise when at rest, but with others they do not. They are either carried fully extended above the back, stretching out horizontally, or when folded are directed backwards, covering the abdomen and each other, and either slope roof-like, lie flat, or are rolled. Many of those kinds possessing the latter habits have the hind-wings linked to the anterior pair by a stiff bristle fitting into a depression of the latter. Many species possess a fold in the hind-wings, covered with long hairs, from which a more or less strong odour is emitted.

The senses of sight and scent appear very strongly developed, the latter especially among the night-fliers, the males finding the females by this means. The other senses are perhaps much less developed

Those that take any food only take it in a fluid form, usually the nectar of flower, sugary exudations of sap, &c., though sometimes they have been observed to try droppings of animals, &c.—perhaps for a change. Many, like the silkworm moth, take none at all, and die soon after pairing or deposition of eggs. For the latter they always select a place affording the proper food for the future larvæ, in which frequently great sagacity and discrimination is evinced, though on the whole the general intelligence of the order is not nearly so high as that of some others.

In respect of man they are quite defenceless, none being poisonous, so far as is known, and their only safety is in flight. Many are so shy that they can be only captured with difficulty, unless they are paralysed by wet or cold. Some of them trust for safety to the concealment afforded by the agreement of their colouring with the surroundings selected for resting, but when discovered fly off with great rapidity. Many, however, are quite dull and clumsy, scarcely moving when handled.

Butterflies and moths occur in greater or less number over the whole surface of the earth to the extreme polar regions and snow of mountains, but are found in greatest abundance, size, and brilliancy of colour in the tropical parts of the earth, notable where a moderate and continuous state of atmospheric humidity prevails. South Australia is not blessed with such a climate, except periodically, and in consequence it is comparatively poor in the larger and more conspicuously coloured species.

Kirby, in his work on European Butterflies (1882), states, that some 40,000 species of Lepidoptera were already described, of which Britain contains 1,900, and that probably 100,000 species would be found over the whole world. How many there might be in South Australia is impossible to state, as the smaller and duller species are scarcely known, except from a few small and isolated localities. In Master's Catalogue of 1873, some 203 species of diurnal butterflies are enumerated for *all* Australia, which is only equal to the number found in Germany and Switzerland, and very low considering the highly favourable climate of the Northern parts of Australia.

The whole class of Lepidoptera can be divided into four more or less distinct sections, viz. (1) DIURNA, day-fliers, or genuine Butterflies; (2) CREPUSCULARIA, twilight-fliers, or Hawk-moths; (3) NOCTURNA, night-fliers, Moths proper; (4) Micro-lepidoptera, or Mothlets. Those of the first section are also called RHOPALOCERA, or club-horned, those of the last three HETEROCERA, or variously-horned, referring to the form of the antennæ.

The diurnal lepidoptera, or Butterflies, are characterised by comparatively large wings, borne more or less elevated over their back, the posterior pair not furnished with bristles linking them to the anterior wings; a slender body, covered mostly with short scales; long, or moderately long and slender antennæ, ending in a more or less abruptly formed club, and diurnal flight. The caterpillars are usually more or less bristly, many furnished with a forked, retractible horn upon the upper part of the thorax, which emits an unpleasant odour. The chrysalids are more or less angular, suspended by a stout, short thread, the middle being fixed by a silky band.

The Hawk Moths have long narrow wings (the hinder pair usually much shorter), and extended horizontally or sloping; the body is generally thick, small, more or less conical, and pointed; the antennæ rather short, gradually thickened towards the short conical or pointed tip, and either round or three-sided. Their caterpillars have frequently a conspicuous soft horn near the hinder extremity. The chrysalids are stout, pointed rearward, and many wriggle actively at the slightest touch. They either hide in a cavity below the surface of the soil or spin leaves around them with irregular loose silky threads.

The Nocturna, or Moths proper, have broad wings, very much varied in form, both pairs nearly equal in length, and either stretched out flat, or folded and carried flat or sloping, covering the abdomen. The body is usually proportionately short, bulky, and clothed more or less densely with hair-like scales. The antennæ are either doubly pectinate (comb-like), serrated (saw-like), or filiform (thread or bristle-like). Most of them fly only by night, but some are day-flyers habitually. Their caterpillars and chrysalids are very varied in form. Many of the former spin a more or less dense cocoon of silk before they assume the pupa form.

The Micro-lepidoptera, or Mothlets, have mostly narrow wings, which are carried either sloping over or rolled around the slender abdomen. The antennæ are thread or bristle-like. The caterpillars live either concealed within the substance they feed on, or spin a silky bag, which they carry about, and within which they also change into the chrysalis. Some leaf-miners are legless.

Respecting systematic classification, a few general remarks will suffice here, as the various sectional and family relations will be touched upon as occasion arises. W. R. Kirby, in his fine work, "Butterflies and Moths" (1882), divides all lepidoptera into MACRO-LEPIDOPTERA, and MICRO-LEPIDOPTERA. The first division comprises five sections, viz.—1.

RHOPALOCERA, nine families. 2. SPHINGES, five families. 3. BOMBYCES, 14 families. 4. NOCTUÆ, four families; the first (Noctuidæ) is re-divided into 18 sub-families. 5. GEOMETRÆ, two families.

The second division also forms five sections, viz. —1. PYRALES, six families. 2. TORTRICES. 3. TINEÆ, four families, the third (Tineidæ) being separated into 30 sub-families. 4. PTEROPHORI. 5. ALUCITÆ.

The sequence of the above classification will be adhered to in the following articles for the sake of convenience of reference.

In his "Text-book of Entomology," Mr. Kirby has employed a different and more complicated system, many families being reduced to a lower rank and their sequence changed or inverted, but this is immaterial for the present work.

A few words on the collecting, mounting, and preserving of butterflies and moths will conclude the introductory remarks.

The principal implement for catching is the net, which is composed of a frame and bag. The former in its simplest form consists of a ring of strong wire (No. 5 or 6 of fencing wire will do) from twelve to sixteen inches diameter. The ends are bent at a right angle to the transverse diameter, so as to form a short handle of about four inches in length and fastened together by a string, thin wire, or a flattened ring of metal, and can either be used with or without a stick. In the latter case it is fastened to it by tightly winding some strong twine or cord around the joint. The ends of the wire-ring may also be made shorter, and soldered to a hollow socket of tin or brass four inches long, and tapering from five-eighths to one-quarter of an inch, so as to enable one to use sticks of various diameters, the end being pushed tightly into the socket. The length of the stick, which must be a strong one, varies according to requirements. Framerings in four hinged sections, one attached to a screw that fits into a detachable socket are very convenient to carry in a bag or pocket when not wanted. In the field sweeping *after* the insect is much oftener successful than meeting its flight, except with beetles or other clumsy fliers.

The bag of the net is best made of strong *green mosquito netting* (gauze is too flimsy, muslin not transparent enough), bound firmly around the ring by sewing over it some strong brown linen. The edges meet at the handle. The depth should not be under eighteen and scarcely over thirty inches, and the corners at the bottom should be rounded off, as corners are inconvenient. Some use bags tapering to the base, but after considerable experience they cannot be recommended, as they are too light, and do not collapse quickly enough to prevent the escape of active fliers when enclosed by a sweep.

The enclosed butterfly (*not* moth) is seized by the thorax between the forefinger and thumb, after causing it to fold its wings over the back, and pressed firmly without crushing for a few seconds, when it ceases to struggle and soon dies. It is then placed flat in a triangular envelope of somewhat stiff paper, made by folding a nearly square piece subdiagonally, that is, in a slanting direction, but below the upper and above the opposite lower corner; the ensuing margins, being doubled over, close it securely. Name, place, date, and other remarks deemed desirable being written on one face, the envelope is put in a flat tin box with some cotton wadding to prevent violent shaking about. The specimen is then secure from harm, and others are added to the same receptacle as the chase proceeds. If intended to be sent away by post nothing more is done except allowing them to dry in the envelope after removal from the box.

Large-winged moths can be treated in the same way. The smaller are secured singly in small boxes or glass tubes, and killed at home by a drop of chloroform or ether on wadding being inserted. They can only be sent away when pinned on cork or other substance in moderately strong boxes.

In mounting, a thin but stiff pin is put through the centre of the thorax to about two-thirds or three-fourths of the entire length. Then the pin is pushed through a plate of cork till the insect touches it. A small flat piece of cork of requisite thickness, and as wide or wider than the wing, is put under each, but not quite close to the body, and secured to the lower piece by two short pins. The wings are flattened down in extended position, and fixed by a strip of paper, fixed by a pin before and behind the wings. After all parts of the insect requiring it have been fixed in the proper position by pins, the plate is left in a cupboard, &c., to dry till the insects are perfectly stiff, when they are removed and put into some *tightly*-fitting storage box. The latter should always contain some strongly-scented substance to prevent destructive insects entering. If such should take place, *pure* benzine should be liberally applied with a soft camelhair brush to the thorax and abdomen of every specimen in such box at least twice in succession.

For preservation nothing else is to be done besides exclusion of insects and securing perfect dryness, for if they get damp mould will soon attack and destroy them completely.

The above directions are only intended for those who work with as little apparatus as possible. There is a great variety of appliances, such as settingboards, pliers, &c., and very convenient where great numbers have to be dealt with, but an incumbrance for the amateur and traveller.

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Butterflies are very poorly represented in South Australia, probably owing to the prolonged dryness and sometimes excessive heat of the summer months. Perhaps, also, the fact of its moister and fertile southern portions being almost isolated from Northern and Eastern Australia—rich in butterflies—by vast treeless plains. Yet since the settlement of the country, several species not noticed previously have found their way to its woods, viz., *Danais Chrysippus*, *L.* and *D. Erippus*, Cramer, and continue to maintain themselves.

The order is divided into families, of which nine occur in Australia, according to Masters, viz., PAPILIONIDÆ, PIERIDÆ, DANAIDÆ, Acræidæ, NYMPHALIDÆ, SATYRIDÆ, Libytheidæ, LYCÆNIDÆ, and HESPERIDÆ. Of these, the two printed in common type are unrepresented in South Australia.

The PAPILIONIDÆ are distinguished by having the inner margin of the hind wings concave, and by their hairy or naked larvæ having always a retractile fork on the second body segment. They include the largest of the Lepidoptera in expanse of wings, which in many species are furnished with a tail-like appendage, from which they have received the popular name of "Swallow-tails." Their fore feet are frequently, if not always, abortive.

*Papilio Erithonius*, Cramer, is the only representative in the southern part of the province, and attains one inch in length of body, and three to three and a half inches in expanse of wings. The eyes are dark brown, large, and prominent. The antennæ are black, more than half an inch long, slender, with an elongated gradually thickening club, and its lower part marked by a pale line above. The remainder of the head above is covered with long hair-like scales. The prevailing colours of the wings are black and pale yellow above, the former tints less intense below, and the body wholly pale. A pale streak ascends the face on either side of the long slender black proboscis, is interrupted on the hind part of the head, and extends to the thorax, gradually diverging to the base of the hind wings; another pale streak ascends behind and close to each eye. The thorax is marked by long hairs and thinly-scattered flat scales of pale yellow and blue.

The bases of the wings are black, dusted over with pale scales, a pale streak along the costa or margin, and four diverging rows of small spots before the central vein, followed by a large oblique bar-like spot, and seven smaller ones of various shapes and sizes mark the frontal half of the forewings. From near the end of the inner margin of the hind wings starts a broad bar in a diagonal direction towards the tip of the fore wings, ending in two large oval and a small roundish spot near the middle vein. The margins of the forewings are marked by a double row of lunulate (like a half-moon) spots, the hind wings by six, of which latter the first is inverted, and incloses a black eye-spot with blue and ochreous scales. The inner row is larger than the outer, and those of the hind wings much more so than of the forewings. At the hind angle of the inner and outer margin a large round dark brown spot is situated, edged yellow behind and blue before. The area adjoining it is thinly dusted with pale bluish scales, and contains a small lunulate yellow spot near the broad bar. These markings are more or less accurately repeated on the under side, which shows four additional orange tinted spots near the tips of the fore wings, and in the hind wings a tortuous orange-coloured bar from the brown spot to the vein adjoining the eye spot, and a lunulate spot in the centre, all narrowly edged blue on the inner side, and deep black on both inner and outer.

The insect is found in shady forests and the glens of the hill districts, and used to be fairly common in the earlier years of the colony, but appears now to be rather rare, no doubt owing to the difficulties thrown in the way of its larvæ by the depasturing of cattle and reduction of the native forest flora by the axe of the settler.

The PIERIDÆ have always all the legs perfect, and the inner margin of the hind wings is not concave. Their larvæ are not spiny, and are cylindrical and elongated. The pupa are attached by the tail and a belt round the middle. Yellow and white, varied with black, are the prevailing colours of this family, and the size moderate. The wings are not or but rarely dentated, and seldom show a slight approach to a tail. Two genera occur in the southern part of the colony, comprising only three species.

*Eurema (Terias) Smilax*, Don., is about one inch and a quarter in expanse of wings, and the only *yellow* butterfly of southern South Australia. The wings are much rounded; the tips of the forewings deep black, the tint extending to about one half of the outer margin, whence a narrow dark edging reaches the hinder angle. The hind wings are uniformly yellow, with five or six very small black dots along the outer margin. The underside is also yellow; the fore wings have a small black dot near the middle, and the hind wings several dusky rings and blotches, besides thinly scattered dark scales all over. The insects are not numerous now, fly from September till late summer, and frequent

Composite and Myrtaceous flowers. Their flight is low over the ground, and rather swift.

*Pieris Aganippe*, Donovan, is nearly an inch long in body, and the wings expand to nearly three inches. The head is small, black, and covered with long paler and darker hairs; the thorax is black, with long white hairs, and the abdomen pale yellow. The palpi are long and erect, the antennæ exceed half the length of the body, are black, slender, and the club rather short, somewhat suddenly expanded and curved. The wings, from the base to beyond the middle, are yellowish white, the tint terminating with a tortuous border. A roundish black spot near the middle of the fore wings, and the apical part of both pairs, are black, with a row of white spots (rounded on the inner, and wedge-shaped or fan-like on the outer side), midway between the white basal area and the margin, and follow the curve of the latter. There are eight spots on each of the fore wings and six on the hinder pair, the last spots of the latter becoming indistinct where invading the pale portion. On the forewings, between the pale base and the row of spots, is a broad, curved whitish bar and a short narrow one. On the underside the same markings prevail, with the following additions, viz., the first two spots and part of the third at the tip of the forewing are yellow; a large oval spot at the front of the base of the hind wings, and the marginal spots are bright red, the hinder part of the latter half embraced by a white lunule, the basal part is black to half the distance of the white, following the outline of the latter, except that it does not reach the inner margin; a broad streak near the frontal margin, a small spot at the base of the two next white areas, and one in the black before, and the whole inner margin is deep yellow. The insect, as will be seen by the above description, is much more showily coloured below than above, and is really very pretty, when seen resting with folded wings. The margins of both pairs, above and below, are narrowly edged with white, the hinder ones being more conspicuously scolloped than the others, which are much longer.

The figures in Prof. M'Coy's "Natural History of Victoria," Dec. I., pl. 10, are very good, but the yellow is much too pale in the illustration of the underside.

The larvæ are black, with numerous white dots, and live solitarily upon the Native Mistletoes *(Loranthus)*, of which the commonest in our Eucalyptus forests is *L. pendulus*, and forms large pendulous grape-like clusters on the branches of the gum trees. The pupa is also black, with a broad, white band along each side, and a white spot below. *P. Aganippe* extends widely, and flies from October to March following, there being, probably, several broods. It appears to feed indiscriminately on the flowers of Eucalypts, Bursaria, Myoporum, &c.

*Pieris Teutonia*, Fabr., is much smaller, and only two inches and a half in expanse of wings, the male being somewhat smaller than the female, and more somberly tinted, but both vary considerable in the intensity and extent of the white and black they are draped in. The body of the female is nearly white, of the male darker, eyes, palpi, and antennæ black. The wings are white. The tip of the fore wings from beyond the hind angle to one-third of the frontal margin from the apex, and a small oblong spot at the end of the middle cell is black, enclosing three wedge-like white spots, of which the middle one is largest, and four fine streaks. The margins of the hind wings are broadly black, enclosing two large and three small white spots, the first being the largest.

The underside of the fore wings is much the same except that the frontal margin is black near the base, the discal spot larger, and connected by a fine black curved line with the former, and that the marginal spots are much larger and more pronounced. The underside of the hind wings, though, is very different. It is white, the veins broadly edged with black; the base in front, a spot near the margin of the second cell, the six marginal spots, and the two cells at the inner margin, are more or less yellow.

The white in the wings of the male extend much less forward, frequently not to the end of the middle cell, so that the discal spot disappears, or is only marked by an indistinct halo beyond, the whole tint being usually more or less ashy to yellow. The marginal spots of the forewings are reduced to two or three faint ones, as are also those of the hindwings, or altogether obliterated. The underside exhibits fewer differences, except that the basal portion of the forewings is largely tinted with deep yellow, and the blackish tints of the hind wings largely prevailing over the paler.

The caterpillars of *P. Teutonia* are about an inch long, round, with a black head and legs. The body is brownish above, with a darker stripe on each side, and six rows of pale dots. The underside is pale and hairy. They have of late (1886) become somewhat notorious by attacking in numbers the cultivated Caper plant in some gardens, doing considerable mischief by devouring the leaves. A few caterpillars and some fourteen chrysalids were received on the 6th of February. The first imago made its appearance on the 17th of the same month. The chrysalids or pupæ are about an inch long, and irregularly conical, the head being the thickest part except the methathoracal segment, which is as thick or thicker than the head, and separated from it by a thinner part, thence tapering to the posterior end, which terminates with a flat notched appendage. The anterior part ends in a short pointed process, flanked by a flat one on each side. The thick metathorax bears above a blunt spine on each side. The colour is dark brown to blackish, with lighter zones and spots.

The females of this butterfly are sometimes mistaken for the Cabbage Butterfly (*P. Brassica*) by those who have become acquainted in Europe with the latter by suffering loss from the ravages caused by its larvæ in plantations of cabbage and other vegetables largely cultivated for food.

The DANAIDÆ are represented in South Australia by two species, both of which appear to have somehow found their way here from far-off lands since the country has been settled by Europeans. The family is distinguished by long antennæ, with a narrow, gradually formed club, abortive fore legs in both sexes, and by the inner margin of the forewings not being grooved.

The larvæ are cylindrical, smooth, and rather stout, and furnished with fleshy tubercles or several pairs of slender filaments. They feed, according to Kirby, on Asclepiadæ and Aristolochiæ in their proper home, viz., the warmer parts of America, Asia, Africa, and Northern Australia, but as these families of plants are absent from the extra-tropical parts of South Australia, they must have found some other food plant. The pupæ are hung up by the posterior extremity only.

Like many other conspicuously coloured insects, they are protected from the birds by a disagreeable taste, hence wherever they find plants suitable for the larvæ, they increase readily, and the two South Australian species have thus obtained a footing not only here, but over many other portions of the globe, and have even been seen in Britain.

*Danais Chrysippus*, Linn., is from two and a-half to three inches in expanse of wings, and the slender body about an inch long. Head and thorax are black, spotted with white above and below; the abdomen is brown. The forewings have the frontal margin convex, the border concave, not indented, and the inner edge nearly straight; the tip is broad and blunt. The hind wings are much shorter, their outer margin almost circular, and slightly scolloped. The general colour above is dull fulvous, *i.e.*, a brownish yellow brick colour. The tip of the forewings, beyond the middle cell to the hinder angle, is black, with an irregular oblique white band, terminating in four small roundish dots forming a square, on either side of which are two more, and three between the band and the red; a few, variable in shape, size, and number, are also near the tip and the fringe (as is also that of the hind wings) is alternately black and white. The outer margin of the hind wings has a black border, with faint white dots, the inner boundary scolloped. At the tip of the middle cell, along its outer edge are three small angular black spots, and a fourth, much larger, at a right angle to it towards the inner margin, which is bordered white, and has sometimes a few white scales within. This spot is often absent.

Below the base of the forewings is much darker brown, separated by a narrow black band from the white bar, which, as well as the spots, are the same as above, but larger; the tip as well as the whole hind wings, excepting the black and white narrow margins and spots, is pale ochre-coloured.

Kirby (Butterflies, 27) describes the larva as pale violet, with black and yellow transverse stripes, and says it feeds on *Asclepias fruticosa*. The writer has not met with it, although he caught the butterfly in his garden at Nuriootpa about 1875, and at several other distant places subsequently. The original home of the insect is Greece, Africa, India, and Malaysia, including, perhaps, Northern Australia.

*Danais Erippus*, Cram (*var.* Archippus, Fabr.), is a much larger insect, attaining four inches and a quarter in expanse of wings, and with a stouter body. The latter is black, with dull white spots. The wings are longer, narrower in proportion to the size than those of the preceding species, and above of a more or less bright ochreous red (fulvous) tint, and varied with black veins. The tip and margins of the forewings are black, the former varied by fulvous yellowish and white spots and streaks, the latter by a double row of closely-set small fulvous and white spots and narrow white fringe. The markings below are similar to those above, but much more pronounced and larger; the middle of the tip of the forewings and the whole hindwings are pale ochreous yellow, and the veins broadly bordered with black.

This handsome butterfly is indigenous to America, and from thence it has in a short time spread over the Polynesian Islands to Australia on the one side, and Europe on the other. It is now frequently met with in the shady glens of the Mount Lofty and other ranges in spring and summer, and even occasionally in suburban gardens. "The larva is whitish, transversely fasciated with black and yellow, and has two pairs of blackish fleshy processes on the third and twelfth segments. It feeds on American species of Asclepias" (Kirby, "Butterflies and Moths," page 27). The above description will perhaps enable observers, who have opportunities to look about for the purpose of discovering what plant the caterpillars affect chiefly in South Australia, in order to find out whether this species really breeds here, or if it only appears sporadically as a wanderer.

The NYMPHALIDÆ are distinguished by very small (female) or rudimentary (male) forelegs, more or less dentated wings, and moderate to large size. The larvæ are spiny or warty, or have horns on their head. The family is represented in Australia by about 15 genera, of which only two occur in the southern portion of South Australia, but all the members are numerous in individuals.

*Pyrameis* (*Vanessa*) *Cardui*, Linn.; var. *Kershawi*, McCoy. This brick-red, black and white spotted butterfly extends not only over all Australia, but almost over the whole world, although when specimens from Europe, America, and Australia are compared in detail many differences in the form, size, and tint of the various markings are discovered. Within their own territories these differences are constant, and have led to the establishment of various species, but these, on account of their general agreement in aspect, can scarcely be maintained as such, though they deserve to be kept separate as well-marked varieties.

The prototype of our variety *P. Kershawi* is the "Painted Lady" of Great Britain, which it resembles greatly, but is smaller, rarely exceeding two inches in expanse of wings, and mostly less. The antennæ are slender, with a curved club, tipped white. The body is dark brown, nearly black. The bases of the wings are also brown, succeeded by brick-red. The tips of the forewings and a tortuous band in the red are black, the former marked by a short white bar and several roundish spots in a curve, also a double row of faint pale spots along the margin of the outer border. The hindwings have four round black eye-spots in a line, of which the three last have a blue centre. A row of small oblong spots margins the border, of which the larger one near the anal angle has also some blue in the middle. The teeth of the border are black. The underside of the forewings is nearly the same as the upper, except that the base is not brown, but the tip is, and another large white bar appears adjoining the black band. The underside of the hindwings is brownish and white marbled, the eye-spots are surrounded by a narrow pale ring, and include a few blue scales, as do also the lunules near the border. The presence of the blue distinguish the Australian variety from those of other countries. The larva is dark grey, striped yellow on the sides and back, and marked by yellow dots. It lives singly on sowthistles and other composites. The butterfly is very common in fields, gardens, and open bushy localities during almost all the year, there being several succeeding broods, and is even to be seen in the streets of the city of Adelaide. Its flight is usually low and leisurely, and the resting places, such as the bare ground, stones, pieces of bark, &c., are so chosen that the colouring of the underside agrees so perfectly with the ground colour that one can scarcely discern the insect unless it be quite close and the spot marked by the observer.

*Pyrameis Itea*, Fabr., is from one to three-quarters (males) to two and a half inches (females) in expanse of wings. The whole body, &c., is black, covered with long, brown, hair-like scales. The upper side of the forewings have a brown base, succeeded by a large pale-yellowish patch extending nearly across; the tip beyond is deep black, with three yellowish-white spots in a triangle; the largest and smallest are next to the frontal margin or costa, which is much curved. The hind margin or border is blunt, and almost straight at the tip, from thence forming a wavy "S"-like curve joining the straight inner margin. The males have two small bluish dots between the two smaller pale ones. The hindwings extend much beyond the body, the border is rounded and broadly toothed. Above the base is brown, this tint shading into a deep fulvous red, extending to the anal angle; the front and border is broadly black, fringed narrowly, as well as the forewings, with white. In the red, near the border, are four round spots with small blue centres. The underside of the forewings is much like the upper, excepting numerous fine transverse lines near the costa, a large blue ring between the two largest yellow spots, and the tip mottled brown and silvery. The underside of the hindwings is brown, with darker mottlings, scattered pale scales along the inner margin, and the broad whitish border with a narrow bluish inner and black outer band, are five small, round, bluish or whitish spots, the first, third, and fourth very indistinctly, the second more plainly, surrounded by pale and dark rings; the fifth spot is the largest, the pale-blue being surrounded by dark, this by paler brown, and followed by a narrow ring of black.

These butterflies are widely distributed in South Australia, frequenting grassy glens and fields extending to the seacoast, and bushy mountain gullies or the borders of scrub lands. They are generally extremely shy, and being swift flyers, render capture difficult, except in the cool of the morning or during moist weather. There are at least two broods in the year, the first appearing about September, the other from January till March. They fly usually singly or in pairs, sometimes venturing into the Park Lands of Adelaide, or flitting rapidly through suburban gardens, but on one occasion, in 1875, I met them in scores in a secluded grassy and rocky gully bordering the Murray scrub near Monarto, but so shy and swift that I could not get one. The larva has not been observed by me.

*Junonia Vellida*, Fahr., is usually somewhat under two inches in expanse, and not quite as numerous as the two last, whose habitat it shares to a great extent. However, it prefers lonely dry scrub lands, where it roams from one flowering shrub to another, several together usually enjoying the sipping of nectar, chasing each other sportively, or delighting in graceful gambols during the intervals of the sips.

The prevailing colour of the upper side of the wings is a lighter or darker blackish brown, relieved by some scattered snuff-coloured scales and other markings. In the frontal half of the forewings are two oblong transverse brick-red spots, bordered black, and near the tip a larger and a smaller whitish bar. Near the border, which is marked by a narrow pale line and fringe, is a large brick-red spot including a small oblong and a large round black spot with blue centre; the latter spot is repeated at the underside. The hindwings have two roundish red spots, edged darkly on the inner side and enclose each a round black eye spot with blue centre, which is repeated beneath. Two small red oval spots forming a curve are nearer the base. The border has a whitish fringe, a narrow undulating pale line, and a series of small adjoining pale half-circles, each bordering a black lunule.

Underneath the markings of the upper side of the forewings are repeated in less intense tints; the tip and border are grey. The under wings are mottled grey with an interrupted dark bar, dots, and faint lunules. The border of both wings are less excavated and curved than those of the two preceding species. The larvae and their foodplants I have not been able to to observe.

The SATYRIDÆ include some of the larger and moderately-sized butterflies, all of mixed brown, tawny, and black tints. The family is distinguished by very small front legs, short palpi, and rounded wings, of which the hind margins are either entire or more or less scolloped, but very seldom tailed. They are usually ornamented by black eye spots, with white or blue centres, and are either placed in or near a light-coloured patch or band. The caterpillars live on grass, are slender, and covered with short hair; the head is rounded, and the posterior extremity ends in a small fork. The chrysalides are short and stout, and either hung up by the tail or concealed on or in the ground. Only two genera occur in the extratropical part of South Australia, but they include some of the commonest kinds.

*Xenica Klugei*, Guér., is a rather small insect, its wings expanding only from one and a half to one and three-quarter inches. The males are smaller and darker than the females, and the pattern of the forewings is somewhat different, but the hindwings and the underside of both are nearly alike. The upper side of the forewings of the male may be described as dull black, with five large deep fulvous spots, and a small one near the margin; those of the female have the base to the hinder angle pale ochreous, and five or six irregular spots of the same tint in the black tip. The apical eye-spot is in the middle of the largest patch (or between two small ones), and is of medium size. The hindwings above are lighter or darker fulvous (*i.e.*, reddish brown), with a dull black sub-angular patch in the middle and a narrow zigzac line near the margin. The wavy dark margin is divided by a narrow fulvous line. The fringes are grey, the posterior eye-spots very small, and rather indistinct. Beneath, the forewings are pale reddish yellow in different shades, with some three or four cloudy dark spots and bands, and the eye-spot repeated. The basal half of the hindwings is dark, the rest pale mottled tawny, with a black patch at the tip of the middle cell, and no eye-spot.

The little butterflies are sometimes very numerous around flowering shrubs and trees on the hillsides and scrublands, and even find their way into suburban and city gardens during spring and summer.

*Xenica Achanta*, Don.—In the early part of February, 1884, I captured this species for the first time, flitting about near the little rivulet about a mile up Second Gully, in the Lofty Range, and have since obtained it from several other collectors and localities. In size it is considerably larger than the preceeding species, of a brighter tint of brick-red than it, and with much less black. The costa, or frontal margin, and the border are blackish, the former interrupted sometimes by a narrow extension of the fulvous tint to the edge, the latter divided by a narrow parallel fulvous line. Four narrow, more or less incomplete, blackish streaks cross the forewings obliquely, the apical one interrupted by the large, regular eye-spot. The hindwings have part of the front margin black, and the blackish border divided by a narrow fulvous line, on the inner side of the border another, more crenated, dark line runs parallel to it, resembling half moon spots joined. A circular eye-spot, like that of the forewings, but much larger, and some narrow indistinct dark lines towards the base complete the distinctions. Underneath the markings of the forewings are about the same, but the reddish ground colour paler, especially near the tips. The hindwings are very differently marked. Their ground colour is pale yellowish white, with a number of large, variously shaped, dark spots, more or less pale in the middle, and two large eye-spots, one near the frontal margin and the other opposite that of the upper side. The dark border is divided by a fulvous band; both wings have a pale fringe. The sexes differ in size and details of colouration above, the smaller being also the darker, but the underside of the hindwings is characteristic alike.

*Heteronympha Merope, Fabr.*, is one of our largest, most conspicuous, and common species, measuring three inches across the tips of the forewings. The body is very short—about three-quarters of an inch—and small. The base of the forewings and the whole hindwings, except the narrow blackish border and a few narrow zigzag lines, are pale fulvous or yellowish brick-red; the larger apical part of the forewing is deep black, including two large yellow spots and a small one. Near the tip and adjoining the latter is an eye spot with a blue pupil and surrounded by a dusky ring. A similar, but smaller, one is near the anal angle of the hindwings. Beneath, the forewings are of the same colour as above. The tips beyond the spots, though, and all the hind wings are tawny; the latter are clouded by lighter and darker tints, and the eye spot only marked by a black dot. Such is the female.

The male of *H. Merope* is about two and a half inches in width from tip to tip of the wings, which are large in proportion to the dark body. The antennæ are rather long, with narrow clubs; the thorax is stout, and the abdomen slender. The prevailing colour of the wings is reddish brown, brighter towards the margins. Tho tip of the forewings, two oblique bars (one interrupted), a longitudinal, curved streak, and the border is black. In the light patch at the tip a small black eye spot with a minute bluish-white pupil is set. The hindwings are bright fulvous, with a narrow black margin; a variable, sinuated band and a spot joined to a narrow tortuous line are black, and the very regular eye-spot, are the principal marks; the latter has a bluish pupil in deep black, surrounded by a narrow pale yellowish ring and a fine dark circlet. Beneath, the forewings are yellowish tawny, with a large bright patch just beyond the middle, including and bounded by a narrow light and a dark circle. The hindwings are uniformly tawny beneath, with fine brown angular marks and lines. The upper eye-spot is repeated, but very much reduced, and two others still more minute are close together near the frontal margin. The fringe of both wings is pale grey.

One finds these lively butterflies sometimes gregariously in small companies of three or more, flitting along and near the rivulets in shady gullies during January and subsequent months. They requent the flowers of Bursaria, Leptospermum, and other shrubs, which happen to be in bloom, taking short flights from shrub to shrub, yet they are not easily got at, being very restless.

The Heteronympha begins to fly in October and continues to be about till February or March. On one occasion I noticed hundreds flitting by the roadside a mile or two west of the Square Waterhole, County Hindmarsh. This was late one afternoon in January, 1881. I have never seen the insect since in such numbers. The swarm extended over a mile and seemed to make its way slowly in a westward direction, up a gully, but was left behind before the watershed was reached.

The *Lycænidæ* comprise the blues and coppers of English collections, and, in South Australia, are only represented by small and very small species, though in point of numbers they exceed all other families. They are distinguished by delicate structure; prevailing shades of blue, brown, and red; and the perfect forelegs of the female, but usually abortive forefeet of the males. The larvæ are short and broad, thickest in the middle, and both ends nearly alike. Some exude a liquid of which ants are fond. The pupa is hung by the tail. The family and some of its genera extend over the greater part of the inhabited earth.

*Lycaena Discifer*, Herrich Schæffer, is of medium size for the genus, the male being under one inch, the female scarcely an inch and a quarter across the wings. The upper side of the wings of the male are blackish brown, except the disc (or middle part) of the forewiugs, which is deep orange red. The border fringe is white and black alternately. The underside is of the same tints, thickly sprinkled with whitish scales. In the orange patch of the forewings are three small oblong brown spots in a line along the middle cell, which are pale in the centre and around their border. The female is of a uniform pale yellowish brown.

These little butterflies flit about among the grass, frequenting flowering shrubs. In spring they sometimes even visit the city, congregating in small numbers on open, grassy plots, but usually they are solitary and local, though widely distributed.

*Cupido Agricola*, Doubleday, is of about the same size as the preceeding, dark brown above, the middle field of the forewings paler, and the fringe alternately white and black, the former broader than the latter. It frequents open grass lands in spring, is widely dispersed, but not numerous.

*Cupido Serpentata*, Herr. Schæff. (?), is of the same size as the last, but even darker above, with a play of dark purple tints along the nerves, and the black of the fringe much wider than the white. The underside of both wings are pale greyish brown, the forewings with three sets of transverse bands, each formed of two distant curved white lines bordered blackish on the inner concave sides; those nearer the base are short, the outer one complete, parallel to the border, and divided into three parts, of which the middle one is displaced outwardly. The hindwings are marked by intricate black and white lines, and have a conspicuous four-sided white patch adjoining a similar black one in the middle near the border (the former as part of a marginal band). Nearer the inner angle are two black and reddish lunules; the dent next to them forms a short tail.

This species is also widely dispersed, but seems to prefer scrubby hillsides. In October and November I captured a number of specimens on the higher ridges of the Lofty Ranges frequenting the flowers of Pultenaea acerosa.

*Cupido Alsulus*, Herr. Shæff., attains an inch nearly in width, and is of a delicate pale purplish blue above, fringed by pale grey. The underside is light grey, bordered by a fine dark line, and marked by a faint mark in the centre of the forewings. A double row of small oval spots, edged with white, and parallel to the border of both pairs, an oblique row directed to the inner edge, and traces of a third near the base of the hindwings complete its characteristics. This species is one of the commonest in our fields and in open bushy localities. It is met with on clear days almost all the year round. The male has a small tail.

*Cupido Biocellata*, Feld., is slightly smaller than the last, the male is bronze-coloured, bluish at the base of the wings and upon the thorax, the female pale purplish blue. The underside of the forewings is of a yellowish grey colour, is bordered by six lunules, a single wavy band, and has a ring-like spot in the centre, all faint. The underside of the hindwings is ashy grey, with marginal lunules, and a nearly circular wreath of rings enclosing a similarly coloured (dusky and light) spot. Near the anal angle are two black eye-spots with metallic glitter, narrowly bordered by orange. The hindwings have no appendage.

*Cupido Erinus*, Fabr., is the largest of this genus in South Australia, and is about one inch and a half wide. The wings above are blue, except the apex and the border, which are bronze-brown. The underside is of a delicate ashy grey with scarcely traceable darker oval spots. The forewings show a larger and smaller black spot near the lower angle. The species frequents bushy and sedgy hills and plains.

*Cupido Damoëtes*, Fabr., is an inch and a quarter in span, pale brown, shot with pale blue at the base of the wings, the border darker, the fringe white. At the anal angle of the hindwings are two small black eye-spots, being the last of a row of faint round spots along the border, and separated from it by a fine white line. The vein between the eye-spots is elongated into a very slender tail. Beneath the wings are brownish grey, with a broad white band near the border across both pairs, and a number of fine white transverse lines. The scales of the eye-spots are of a dark-green metallic lustre. This species is one of the commonest over large areas during spring and summer. By some authors (Butler, &c.) it is considered as a variety of *Cupido (Lampides) Boeticus*, L., of India, others (Masters, &c.) enumerate it as a separate species.

*Cupido Heathii*, Cox *(paradoxa*, Guest).—Not having a specimen of this insect, I copy the description of Mr. Guest:—"Size, one and a quarter inch. Both sexes nearly alike. Colour, rich brown, shot with plum colour. There are no spots or markings, excepting that the wing-rays are yellowish brown. Fringe bluish white. Underneath the entire surface of both wings is shiny white, with the least possible tinge of blue, without markings, excepting a row of very minute jet-black spots along and close to the outer margin of both wings" (Trans. Roy. Soc., S.A., V. 36). "During the last two years I have taken it rather plentifully, and it appears to be widely distributed. Out in October, and, I think, must be double brooded, as I also take it quite fresh in March" (Ibid viii., 62).

*Ialmenus Evagoras*, Don. (?), is more than an inch and a half across the wings, which are brown, with white fringe, and the basal half or two-thirds flushed with changing blue. The hindwings are rather deeply emarginated near the anal angle and between the second and third vein, from thence have a conspicuous black triangular spot, edge white, near the border. Beneath the wings are yellowish-grey, with numerous faint, dusky, oval spots, edged white, and either solitary or joined into bands. At the anal angle is a small black and yellow eye-spot, and another opposite the spot on the upper side. The species is not very common. The specimen described was taken on the first of December, near Burnside.

*Ogyris Amaryllis*, Newman. The male is about one inch and three-eighths, the female one inch and five-eighths, across from tip to tip of wing, and the prevailing colour a brilliant blue. The border of the forewings is entire or slightly crenated, that of the hindwings deeply toothed behind, especially those of the female. The latter has the front margin of both wings, the tip of the forewings from the middle cell, and the border broadly velvet black, and the border of the hindwings edged with triangular black spots; the fringe is white. The male has only the extreme tips of the forewings and a very narrow edging of the borders of both pairs black. The underside of the forewings of the female have the costal cell and the greater part of the wings below the middle cell deep brown. A bright orange triangular spot, edged white and blue, and divided by a black bar, occupies the basal part of the middle cell, and is followed by a large, round black spot with a white angular bar in the centre; next comes a curved white bar to the middle rim, a curved black bar to the lowest branch of the same, and beyond it a white one shading into brown, with some indistinct lines. The hindwings have a large brown area in the middle, and three whitish ones, over which are dispersed a number of oval light-brown spots, narrowly edged black. The forewings of the male have no orange, but the middle cell and continuous space is black or deep brown, with five short, white bars, with more or less brilliant blue; the longer dark bar and the pale tip and border are similar to those of the female. The hindwings have no dark area, and, excepting the spots, are grey. This beautiful butterfly was previously only known from Queensland, the male only being known and described. It was first made known as occurring at the southern part of Yorke's Peninsula by Mr. J. G. McDougall, who captured specimens of both sexes in February, 1886.

*Ogyris Otanes*, Felder, is larger than the last, the male measuring one inch and a half, and the female nearly two inches across. The colour of the male above is a uniform deep brown with purple lustre; beneath it is pale brown, with an irregular black patch at the apex of the middle cell with two short narrow white and blue bars, and three small dark spots in the paler area beyond. The hindwings are quite plain. The female has the hindwings deeply scalloped, a large, oblong, pale yellow patch near the tip of the fore-wings, repeated beneath, and the larger part of the wings, from the base outward, deep purple blue of changing lustre. This species appears to be very local, as I have only found it in the sandy scrubs near Nuriootpa and Lyndoch Valley, where it used to be fairly numerous, sipping the nectar of the flowers of Leptospermum lanigerum and other myrtle blooms, from October to December.

*Ogyris Halmaturia*, spec. nov., was captured by me at Kangaroo Island in November, 1886, having been observed in open glades and along roads in the scrub from Queenscliffe to C. Borda, but not very numerously, and is extremely shy. It comes nearest to *O. Orætas*, Hew., but differs in various details from Hewitson's figure (Cat. Lyc. Brit. Mus. T. 1., fig. 12 and 13). The female measures two inches across the tips, and the male one inch and five-eighths. Viewed from the front the wings above, except a broad brown margin, are of a deep glossy purple in both sexes, the fringe white, mixed with black; seen from behind they show an almost uniform deep bronzy brown. Spaces bared of scales are of a deep, changeable violet tint, and the underside of the scales a brilliant metallic light blue or purple. Underneath the forewings of the female are blackish brown, the tip and border varied with grey in indistinct bands and lines. The fore part has three short pale metallic blue bars (one minute) in the middle cell, an intensely black one between the second and third, another beyond the last, bounded by a broad white band, which is separated from the grey tip by a scalloped band of brown. The underwings are ashy grey beneath, with a brown, black bordered patch near the middle, a dusky band formed of four "V"-shaped rounded spots, and several other similar coloured ones near the base and frontal margin, all edged black. The wings of the male have a dusky fringe and are underneath of a nearly uniform pale bronzy brown. In the frontal half of the fore-wings are the silvery blue bars as in the female, one bordering, the other inclosed in a deep black patch, showing some scattered metallic scales. Beyond this extends a narrow transverse blackish brown band nearly across the wing. These butterflies were observed to frequent the flowers of Melaleucas and of Aster exul.

The HESPERIDÆ or Skippers form an isolated family, showing little affinity to any of the butterflies, and differ nearly as much from the true moths, in point of fact they form, with the Australian genus *Synemon*, of the Agaristidæ, the connecting links between them.

They have a stout body and a broad head; the antennæ are wide apart and have a small brush of hairs at the base, are rather short, and the club is often reflexed or hooked at the tip. They sit on low plants near the ground, are shy, start quickly, and fly fast, but low, and only for short distances, hence their popular name. The wings are not much longer than the body; the margins of the forewings are almost straight and angular. The hindwings are round, and project not much beyond the body. The legs are perfect, and the hind tibiæ have usually four spurs, of which two are at the end and two near the middle; the latter are sometimes absent. The prevailing colours of the Australian skippers are brown or black, spotted white, yellow, or orange. The size varies from three-quarters of an inch in span to nearly two inches. At rest they wear the wings half erect.

The larvæ are short and taper towards both ends; they have a round head, are thinly covered with fine hair, and live on or between leaves lightly spun together. In the same situation are found their chrysalides, enclosed in a thin web.

The family is distributed over the whole earth, but most species, according to Kirby, are found in South America, where also occur the largest, brightest-coloured, and most perfectly-shaped forms, but only in Australia is found the nearest link connecting them with some other group of Lepidoptera, viz., the day-flying moths. None such joining them to the other butterflies have yet been found.

There are a number of species in South Australia appertaining to several genera, and some of these are by no means rare, but are very difficult to capture, being very shy and active, and though only flying a few yards at a time, do it so rapidly in hot bright sunlight that one may start scores and yet not catch one. They are also in the habit of hiding between and below the foliage, which very effectually adds to their safety.

In the "Transactions of the Royal Society, South Australia," the writer described and figured six species, some of which have since been identified with some previously described from elsewhere, and Mr. E. Guest has added a seventh to the number.

From the above descriptions the following is more or less a reproduction, as the Museum is only in possession of a few species.

*Pamphila gracilis* (*Ulama*, Butler ?) is, perhaps, our smallest of the Hesperidæ, being under one inch in span. Its body is slender; head, thorax, and abdomen black, the segments of the latter white. The wings above are dark bronzy brown, the anterior pair with a white band near the outer margin and short white bar near the middle. The underside is much paler; the fore-wings have four small white spots near the apex, the hind-wings a white elongate spot near the base and two rows of four and five white spots respectively, nearly parallel with the outer margin.

This species was captured near Salisbury, about 1879 (Hesperilla gracilis, Trans. Roy. Soc., S.A., 1880, p. ii., 7), by Dr. Engelhardt.

*Trapezites trimaculata* is over one inch and a half in span, and is one of the largest representatives of the family in South Australia. Its body is stout, the antennæ short, thinly hairy, and the club reflexed. Its colour is a lighter or darker umber-brown, with black and light lines on the thorax. The wings are somewhat paler, the fore-wings marked with a fine black line and dot (near the costa), and three yellow spots forming a triangle, one being near the middle, the others near the outer margin. The underside is paler; the discal spot of the fore-wings is reproduced, and so is the costal black spot, but extended to a short bar; the under-wings have four round white spots edged black. A specimen was caught at Monarto, Co. Sturt (Op. cit. ii., 1).

*Trapezites Petalia*, Hewitson, is as large as the last. The thorax is nearly black, the abdomen brown, with an orange spot at the base. The wings are reddish brown near the base, blackish towards the outer margin with three angular white spots in the disk (the middle), one transverse near the tip and a minute one close to the outer edge. Beneath the colour is paler and more greyish. This discal spot and partly the apical of the fore-wings are reproduced with narrow black borders. The under-wings have a small oblong white spot near the middle and three round ones near the border, all edged black.

The species was captured in open scrub on Yorke's Peninsula in November and is by no means rare (Op. cit. pl. ii., 2).

*Hesperilla atralba* is smaller and more slender than the last. The body is brown, almost black, the forewings are reddish at the base, the rest black with three (or four) angular white spots in the disk and two near the tip; the border (of both pairs) is dentated, with a narrow parallel interrupted white line. The base of the hindwings, and more so a rounded patch in the middle, is greenish, the remainder blackish brown. The underside of the first is nearly the same as above, except a yellow streak at the base of the front and the ashy-grey tip; the underwings are also ashy-grey, with ten small dark rings, five of which forming a band near the border.

The species was found on Yorke's Peninsula during March in open grassy and bushy places, sipping the nectar of *Dampiera rosmarinifolia*, and other low plants.

*Hesperilla lutea* is considerably smaller; body and wings are blackish brown above, the forewings with four whity-yellow spots near the middle, and three near the tip, all edged black, the hindwings with one yellow one in the centre. The border is fringed grey and not dentated. Beneath the forewings have four black bordered white spots (three in a row) beyond the middle; the tip and a streak along the front are yellow. The hindwings are uniformly yellow, with a black oval ring in the middle.

This species was caught near Ardrossan, Yorke's Peninsula, in November (Op. cit., pl. ii., 6).

*Taractrocera flavovittata*, Latr. (?) (Hesp. bifasciata, Tep.), is about an inch and three-eighths in span, and dark sepia brown. The forewings have seven or eight yellow oblong spots; the hindwing a small round one near the base, and a broad yellow and white band parallel to the base. The body is darker, streaked and banded yellow. One specimen was caught near Lyndoch (Op. cit. pl. ii., 4.).

*Taractrocera papyria*, Baisd., is much smaller, and under one inch in span. The body is almost black, the wings brown. The forewings above are streaked orange at the base, and have an interrupted bent orange bar beyond the middle, bordered by a fine black line inside. The hindwings are darker, with some indistinct streaks and a broad diagonal incomplete orange bar. Beneath the forewings are nearly the same pattern, but less distinct, while the bar of the hindwings and a small roundish spot in the disc are silvery white.

The chrysalis is very stout, the abdominal part very short and pointed, and pale yellow-white, without any visible web. The specimen in the Museum (and only one seen) is fixed by a few threads to a small sprig of Acæna sanguisorbæ, which is probably its food plant. The species is numerous in the woody hillsides and glens of the Mount Lofty ranges, and was first noticed and described as Hesperilla fumosa by Mr. Guest, of Balhannah (Op. cit. vol. v., p. 37), for South Australia. The change of names from the older publication are chiefly on the authority of Messrs. Guest and Meyrick.

This concludes the account of the South Australian Rhopalocera or Butterflies proper, so far as known hitherto.

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## II. SPHINGES OR HAWKMOTHS.

The Sphinges or Hawkmoths form the second section of the Lepidoptera, and owe their popular name to their habit of poising themselves hawk-like over the flowers while sipping the nectar by means of their long tubular trunk, which in a state of rest is rolled up spirally into a flat helix, and concealed beneath in a groove. Its length is frequently equal to or exceeding that of the whole body. The latter is usually quite smooth, cylindrical, much thicker in proportion to the size of the wings than that of all butterflies and most moths, and ending in a point or flat brush. The antennæ are more varied in form than in the day-flyers, or even the true moths, in one family resembling that of butterflies, in another that of moths, but more or less thickened forward. In the true hawkmoths they are quite peculiar and unlike any other section, viz., thin at the base, gradually thickening to near the end, and then rapidly contracting to a point, which is sometimes curved.

They only fly during twilight — evening or morning — or in bright moonshine; the other families fly in broad daylight like the true butterflies.

The section is divided into eight families, viz., *Sphingidæ*, *Thyrididæ*, Sesiidæ (or Ægeriidæ), Uraniidæ, *Castniidæ*, *Agaristidæ*, Chalcosiidæ, and *Zygænidæ*, of which the three last are sometimes joined to the first division of true moths. Only those in italics are represented in South Australia, and in the whole only meagrely.

The SPHINGIDÆ or true hawkmoths are represented in the southern part of the province by only two species, neither of which is ordinarily very common, and one perhaps an introduction from Europe or India.

*Deilephila (Chærocampa) Celerio*, Linn. (variety), varies in extent of wings from two inches to three inches and a quarter, the body being about an inch and a quarter to one inch and a half long, thick, smooth, and pointed. The forewings are sharply pointed, broadest at the border, the inner margin curved suddenly inwards. The colour is pale brown; a broad, somewhat curved, silvery white stripe extends from the inner margin near the base to the tip, the space before it is marked by a silvery patch near the base and three silvery streaks along the otherwise black veins. The innermost margin from the band to the anal angle and a fine line parallel to and separated by an equally fine black one from the border are also silvery. The hindwings extend slightly beyond the hind angle of the anterior pair, their front margin or costa fitting exactly to its sinuosity. The base and inner margin are pale crimson, the border fringed narrowly with silvery white, followed successively by a broader ochre yellow band, a narrow black line, and a broad, pale, rosy band interrupted by five black veins; the remainder of the disc and costa is deep black. The body is paler than the wings; from the face inside the eyes two silvery or yellowish streaks extend along the sides to the base of the hindwings; along the back of the thorax a broad ashy band extends, which is continued nearly to the end of the abdomen in the form of two fine silvery lines joined by three or four patches of white. Between the inner and outer streaks in the thorax another shorter silvery or golden streak occurs, and along the upper part of each side of the abdomen four small double dashes of silver are seen. Underneath the wings and body are pale greyish brown, clouded darker, while the palpi and a broad streak on the prothorax are silvery white. The male is much smaller than the female, but similarly coloured.

The caterpillars are two and a half to three inches long, rather thick, dull green or pale brownish, with three round dark blue eyespots, surrounded narrowly by yellow on each side of the first three segments, the last spot being the largest; a pale line runs along the whole length to the depressed horn near the hinder extremity; the remainder is covered densely by fine circular, darker brownish dots.

The caterpillars live, so far as known, only upon the leaves of the vine from October to December, when they spin together the edges of one, or of several leaves, by a wide-meshed network of silk, and on the second day change into an active chrysalis, tinted greyish or brownish, with darker dots and a sharp spine at the anal end. In from 23 to 24 days the perfect insect appears, frequenting the flowers of various Leguminosæ and other plants.

This hawk-moth was known to the writer to have been caught as early as 1863, but considered since as extremely rare, until in 1885 it became less so, and very numerous in the following two seasons, both of which were distinguished by great dryness and hot summers. There appear to be several broods, the chrysalides of the last, about April, remaining undeveloped till next spring.

The Australian Vine Hawkmoth and its caterpillar is so much like the European Sharp-winged Hawkmoth that it appears undesirable to separate it specifically, though it is slightly differently coloured, and has been probably introduced with European or Indian plants.

*Chaerocampa pallicosta*, Walker (Variety ?).—This is the only other species occurring in the southern part of the province, and truly indigenous, the caterpillar feeding on various shrubs such as Banksia, Grevillea, Hakeas, and also vines, but usually solitarily. The moth agrees so well in form and colouring with Butler's figure of Ch. pallicosta (" Typical specimen in the Brit. Mus."), that I think it is at most entitled to varietal rank.

The body and wings are snuff brown above the latter with an indistinct, broad dark transverse bend in the middle, the remainder with fine, pale and dark dots and marks. The front margin is narrowly pale; the hooked antennæ (above); a line on each side of the face and thorax to the root of the wings; the palpi and the legs are white, or pale yellowish. The short hindwings are red with a black border. The underside of the wings and the body is dark red, passing into brown near the border of the forewings, and thickly marked by minute transverse black streaks. Some of the females have the forewings dark ashy grey, and the red only extending half way along the middle of the forewings, the remainder being a pale rusty color. Of two caterpillars quite alike, and taken the same day from some vines, the moth of the one had grey, the other brown forewings; the one was mostly red underneath, the other pale, rusty grey. The caterpillars are dirty green with numerous dots, several longitudinal lines, and some dark blue black and yellow eyespots. Some caterpillars obtained on 21st March spun their cocoon on the 1st of April, and the imago appeared on the 1st and 9th of May respectively, thus occupying from 30 to 39 days for the chrysalis state. The females measure about two inches and a half from tip to tip, the males one inch and three-quarters, with corresponding size of body. They fly late in moonlight nights, appearing even in suburban gardens, and sometimes dash at the lamp through open windows, moving about very swiftly. About Adelaide they are not rare, and have been received from places between one hundred and two hundred miles north.

The THYRIDIDAE are much smaller insects, the hind wings much larger in proportion, and of black color with white spots prevailingly. There is only one species that I know of, but have no specimen. It flies early in the evening during early spring, keeping low among the shrubs of mallee scrubs, and making a loud, very peculiar humming noise, while swiftly circling about. It measures about one inch and a half across the wings, the first pair rather square, and black with white marks and a semi-transparent spot near the middle. The hind wings are orange red, with black marks. This is mentioned in order to induce country collectors to favor the museum with some specimens.

The SESIIDÆ are not represented in South Australia, though present sparingly in other parts of the continent. They resemble in size and form some of the hymenoptera or wasp-like insects much more than moths, their wings being very narrow and wholly or partially transparent, and their abdomen is banded by various colours, like that of certain wasp.

The URANIIDÆ resemble some Papilionidæ very much in form, habit, and colouring, their wings being very large, the hinder pair conspicuously tailed, the body slender, and the iridescent green or reddish stripes upon a deep black ground, very gorgeous. Their antennæ are long and scarcely thickened. They are absent from South Australia (at least the southern part); one or two species occur in North and North-East Australia, but their true home is India, Central America, and other tropical countries.

The CASTNIIDÆ are smaller than the last, some resembling the Nymphalidæ and Pieridæ in shape, while others mimic the Hesperidæ. They are day fliers, like the last, have a stout body, longer or shorter than the hindwing, large, more or less gaily coloured, wings, which they partly fold when at rest like some of the moths, and their long slender antennæ are much thickened in the middle, or even clubbed. In South Australia they are only represented by the endemic genus *Synemon*, the members of which greatly resemble some Skippers.

*Synemon Sophia*, White, is the commonest species, and about one and a half to one and three-quarters of an inch in span. Head, thorax, and antennæ are black (the latter with a short club tipped brown), the abdomen is brown. The forewings are deep brown, with a white spot in the middle near the costa and a short white band half-way to the tip, both adjoining, with scattered white scales forming cloudy greyish bands. The hindwings are black, with two bands near the border composed of three and four orange-red spots respectively, and a spot in the middle of the same colour. Beneath, the body is pale; a series of ten spots divided by the black veins, two irregular bands and the base of the forewings are orange-red, the rest black. The hindwings have the red spots of the upper side repeated, but more intensely tinted, and the inner margin broadly pale brown.

This and other species fly from October to December, keeping low among shrubs and tall grass, and are very shy and swift, though seldom going any distance without settling. The species is widely distributed.

*Synemon Theresa*, Doubleday, differs from the last in being much darker and having the bands of the hindwings entire. It is found near Lyndoch and other hill districts.

*Synemon Scaria*, Felder, is smaller and rarer than the preceding. The forewings above are blackish-brown, mottled with very indistinct spots and bands; the hindwings are brick-red, bordered narrowly and interruptedly by a black band; another, very narrow band, formed of two or three spots, is near the middle. The underside of both pairs of the wings is orange-red, the darkest markings of the upper side being reproduced with indistinct outlines.

One specimen was captured by me in 1879 at Ardrossan, Yorke's Peninsula.

Observations about the life history and the habits of the various species of this genus are very desirable.

*Synemon Mopsa*, Doubleday, cited by Stokes and figured by Butler as South Australian, has not been observed by me, nor have I received specimen from other collectors.

The AGARISTIDÆ are moderately large in size; their antennæ are long, slightly thickened towards the end, and very slender; the forewings are rather broad, and not much longer than the hindwings, the borders of both much rounded and not toothed. When extended, they give the insect the appearance of butterflies, but are worn slopingly when at rest like those of true moths. The abdomen is moderately stout, a tuft of hair-like scales terminating it. The prevailing colour is deep black or brown, varied by yellow or white bands and spots with South Australian species. Those of Tropical Australia are much more gorgeous, often sporting red and blue and green, arranged in showy patterns. The larvæ resemble those of the Silkworm Moths in appearance to a certain extent, their prevailing colours being creamy white to yellow ochre, marked all over with small deep black spots or bands, and are either hairy or smooth. Those of *Agarista Glycine*, Lewin, are a notorious pest, as they attack the vines in Victoria, and do much damage, but are absent in South Australia. When mature, the larvæ bury themselves in the soil, and spin a silky cocoon mixed with earthy particles (McCoy, Zool. Vict. Dec. I.).

The Genus Agarista is restricted to Australia and some adjacent islands, but is represented in India by Eusemia and other genera. In South Australia some four or five species occur, of which some are very common, while others are scarce, but all difficult to capture, being extremely shy and active.

*Agarista Casuarinæ*, Scott, is our largest and rarest species, and measures from two and a half to three inches in expanse of wings, the body being less than one inch long. The body and wings are deep black, relieved by pale marks. Two narrow yellowish white stripes extend from the base of the palpi to beyond the front margin of the thorax, where they unite into a single one, terminating opposite the base of the hindwings; a similar stripe starts at the base of the forewings on each side, parallel to the middle one, and reaches a little farther; the tuft at the end of the abdomen, the thighs of the first pair of legs, and the tibiæ of the others are deep orange. The forewings have four pale yellowish white bars (the first at the base narrow and curved, the second broader, straight, and reaching the inner margin, the third interrupted and shorter, the fourth broadest, but ending in the middle), a zigzag line, remote from the border, with two projecting angles, which is continued into, and extends beyond the middle of, the hindwings, and which have, besides, an angular pale spot near the middle. The nine veins of the forewings beyond the zigzag band to the border are also white. The border of both pairs are fringed pale, that of the hindwings more conspicuously so. The underside is very similar to the upper, but the white bands are more conspicuous.

The larvæ do not live upon the leaves of the Sheaoak (Casuarina), but upon those of a species of Loranthus or Mistletoe, a parasite much infesting this and the Exocarpus (Native Cherry) occasionally. They are greyish black, with many narrow yellow bands, the head, first segment, legs, and claspers deep yellow, and the third segment from the end scarlet (see McCoy, Zool. Vict., plate 8, figs. 5-8).

The moths are mostly seen about the tops of flowering Eucalypts, seldom coming near the ground, except when benumbed by wet and cold, and fly swift and far. The specimen described was captured at the end of January on the flowers of a tall shrub of Bursaria on a steep hillside near Adelaide, others were seen near Burra, Nuriootpa, and in the Murray Scrub.

*Agarista latinus*, White (Angas, South Australia), is from two to two and a half inches wide from tip to tip, and of a deep black tint. The head and thorax show some small white spots. The forewings have some minute blue scales scattered near the base; a broad, somewhat wavy, yellow band from beyond the middle of the front margin to near the hind angle (white near the front), and the extreme tip narrowly edged white. The hindwings are also deep black with a broad snowy white border, nearly interrupted near the front angle and enclosing three or four small black spots. The colouring underneath is the same as above, but the breast and forelegs are deep brownish red, as well as a tuft on the tibiæ of the hindlegs; the feet are banded white, and the tuft at the abdomen reddish brown.

In January and February, 1884, dozens were seen sipping the nectar of the Bursaria flowers in the gullies of Mount Lofty, but only a few could be captured owing to their excessive timidity. Once disturbed, they would not admit of a nearer approach than some five to ten yards notwithstanding the greatest caution.

*Agarista Ephyra*, White, is much smaller, scarcely exceeding one inch and a half in expanse of wings. The body is deep brown, with pale scales on the abdomen and the tuft yellowish red. The forewings are black and have yellow spots, viz., a broad, somewhat curved bar near the tip, from the costa towards the anal angle, a large four-sided and a small roundish spot near the front, and three spots near the inner margin, of which the middle one is the smallest; the border at the tip is fringed white and the veins are marked by short white streaks; between this row and the large yellow bar are three minute white spots. The hindwings are also black, with an angular pale yellow spot. The fringe is alternately black and white and very narrow. The colouring of the underside is much the same; the anal tuft and some parts of the legs are orange and fulvous red. The caterpillars have not been observed.

The insects fly by day among the grass or openly wooded localities from September to December, but are not very frequently met with.

*Agarista Lewini*, Walker, is still smaller than the last, ranging from under one and a half to nearly one and three-quarters of an inch, and in the markings resemble the last very much, but their colour is white or nearly so; the markings are much smaller or narrower, especially the middle spot of the forewings, while that of the hindwings is either in the form of a short narrow bar or almost obsolete. The fringe at the tips of both pairs of wings is white, the rest brown or alternately brown and white. Between the border and the broad bar of the forewings are two rows of short white streaks, diverging towards the costa or front margin.

The caterpillars are about an inch and a half long, hairy, creamy white with many small black spots and bars, and the head, the first, and the two last segments are marked with orange or buff (McCoy).

The moths fly for several months in spring and summer in open bushy glades and in fields, and have even been met with in suburban gardens and the city park-lands.

The CHALCOSIIDÆ are apparently not represented in South Australia. They are of rather large size, and resemble the butterflies of the genera *Euplœa* and *Danais* to a surprising degree in respect of form and colour, but their antennæ are not clubbed, are saw-like or combed in the middle and pointed at the end. India, China, Japan, and North-Eastern Africa are their homes.

The ZYGÆNIDÆ are day-flyers like the preceding, and resemble the Sesiidæ in form. The antennæ are slender, thickened slightly in the middle, and sometimes serrated or pectinated in this part. The wings are long and rather narrow, reaching beyond the abdomen when closed, but the latter extends much beyond them when expanded. These are worn sloping at rest, and have sometimes transparent spots or streaks.

The caterpillars live and feed openly on plants, are hairy, and when mature, spin a cocoon on a twig of their food plant.

The family is represented in South Australia by two closely-allied genera, the members of which are all small, but some adorned with tints of metallic lustre.

*Procris apicalis*, Walker, is one of the commonest species, and about three-quarters of an inch in span. Above the forewings, body, and antennæ are bright metallic green; the hindwings, the fringe, and the underside of both pairs of wings are smoky brown, the last paler than the first two, and with broad green borders beneath. The anal tuft is orange. (Specimens killed with cyanite or benzine are apt to change the green to a purplish bronze.) The moths fly, intermixed with several other species, from September to November in sandy scrubs and bushy hillsides. Their food plants are the various species of Hibbertia (*H. stricta*, *acicularis*, *densiflora*, *fasciculata*), flashing out in the bright sunshine for a second or two when disturbed, in order to gain another shrub, where they again settle almost motionless. In this position they are almost undistinguishable. The larvæ and pupa are found on the same plants, but do not appear to do any great damage to them.

*Procris dolens*, Walker (?), is considerably smaller, of a much duller green or greenish purple, and much rarer usually.

There are probably one or two other species resembling the above, but all the species are very difficult to distinguish, as there are some entirely brown naturally, while the scales of the green ones easily rub off or change after death.

*Procris tricolor*, Walker, is rather larger than the first species. The wings are smoky brown, semitransparent, and with paler streaks; the body black, with a crimson collar, and the abdomen marked with creamy white bands and dots. It is rarer than the other species, and is found in mallee scrubs during spring, frequenting Bursaria and other shrubs. It is much more sluggish than the previously described kinds, and mimics to a certain extent some parasitic Hymenopters of similar habits.

*Pollanisus sequens*, Walker, resembles Procris apicalis much in form, colour, and habit, but is larger (nearly one inch in expanse of wings), the antennæ are doubly combed in the middle, and the abdomen is without the orange tuft at the end.

This species occurs chiefly on scrubby hillsides, and flies at the same time as the others.

All the above are widely distributed over Australia, and extend to Tasmania.

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## BOMBYCES OR SPINNERS.

The subsection of the Bombyces or spinners of silky envelopes within which the caterpillar changes into the chrysalis, initiates the true Nocturnal Moths. All these have the antennæ never club-like, but either in the form of a bristle, toothed (serrated) or comb-like (pectinated); the body is mostly stout and often short; the wings ample, both pairs almost equally long and placed horizontally or sloping over the abdomen when at rest. Though by far the largest number fly only by night and hide in dark places by day, some species or even whole genera fly habitually by day. The caterpillars have most frequently sixteen legs, but by the suppression of some of the false legs the number varies down to ten.

The BOMBYCES are closely related to the previously treated families, some of which, in fact, are united with them by Kirby and other entomologists. Without these, however, they still embrace thirteen families, of which only two are probably not, or very sparingly, represented in South Australia. As a group they are distinguished by the following characteristics.

The males, mostly much smaller than the females, have the antennæ strongly pectinated on both sides, while those of the latter are either much less so, only notched, or quite plain; the wings are either spread out flat to a greater or less extent while at rest, or placed together roof-like; the body of most kinds is stout, especially that of the females, and the legs closely covered with long hair-like scales. The caterpillars have usually sixteen legs and include the most destructive ones in forest, field, and gardens in Europe. Although most of our native species confine their attention to native plants, a few have found taste in introduced ones, and consequently are to be ranked as ordinary pests.

The Bombyces (from the Greek word Bombos—silk) include the well known Silkworm Moth, *Bombyx mori*, L., the rearing of which in South Australia is extremely easy, provided a supply of mulberry leaves be at hand; the silk is quite as good as any obtained elsewhere under similar conditions, and its production might attain to importance had the people, who have the opportunity, more skill in making small earnings go a long way. (Perhaps the Chinese could teach us the way.) There are several native species living upon Eucalypts, which produce loose silk—cocoons many times larger and apparently quite as fine and as soft as those of *Bombyx mori*, but their names and habits have not been ascertained at present.

The first family are the ARCTIIDÆ, which include the European Tiger Moth (*Arctia Caja*. L.). They have moderately long antennæ, which are often pectinated either in both sexes or in the male alone, while bright colours and conspicuous patterns grace the wings and body. The larvæ are usually hairy.

*Spilosoma fulvohirta*, Walker, is the commonest native species though not very common. The female is about two inches and a quarter in expanse of wings, the male under two inches; the length of the stout body is about three-quarters of an inch. The head and thorax are white above, the former bordered black about the mouth parts and eyes, the latter with a broad black streak along the middle, and a shorter one on each side near and above the base of the forewings. The abdomen of the female is deep orange (of the male red) above, with six short black spots or bars in the middle (seven in the male) and as many along each side, joined underneath by narrow bands (interrupted in the male); the underside is white, also the larger scales at the extremity. The eyes, antennæ, and apical half of the palpi are black; the base of the latter and the anterior part of the legs are pinkish orange or red, the remainder of the long hairs of the legs white The forewings are blackish grey, with pale veins, two larger irregular white spots near the base of the front and two smaller near the hind margin, two more or less complete or interrupted narrow bars beyond the middle, and some markings near the border in the male, are also white. The hindwings of the latter are white, with a small dark spot near the middle of the front margin, and a narrow interrupted band near the border. With the female these dark markings are paler, but so much wider as to occupy quite half the area. The underside resembles the upper in pattern, but the darker shades preponderate.

The moths fly in the early dusk and during moonlight about March. Their motion is not very rapid, and rather erratic; upon rare occasions they find their way to the lamp in rooms. By day one finds them usually on or near the ground, concealed by grass or low herbs. They are then quite sluggish, scarcely moving, and seldom make an attempt to escape by flight. I have found some specimens close to the seabeach, and have received others from various localities in the Mount Lofty Ranges and other places inland, denoting a wide distribution. The caterpillars appear not to have been observed. The genus is represented by several species in India closely related to the above.

*Apina Callisto*, Walker, is one of the handsomest moths of the province. In span of wing it measures from slightly under to a little over two inches, the moderately-stout body being nearly three quarters of an inch long, ending in a tuft of long hairs, and not reaching quite the inner angle of the hind-wings. The face is extended into a flat proboscis or trunk, blunt in front and notched; a medial line over face and thorax, and two short lateral stripes are black, the other long hair-like scales, pale yellowish white. The antennæ of the female are black, long, slender, and hair-like; those of the male are shorter and deeply comb-like. The forewings, in reflected light, are of a warm coppery brown tint; the veins and a narrow crenate line at the border are black or blackish-brown; the fringe, a row of seven round spots, an oblong patch at the tip, and three short transverse bars, are pale yellowish. The last bar being the longest, reaches to the last vein but one, and is divided at the front by a very narrow, short, black bar. Pale yellow scales, scattered over the brown parts, form indistinct patches. The hindwings are black, with a broad sinuous white band in the middle; a small lunule near the base (the male only), six partly round spots near the border, and the narrow fringe, are white. The segments of the abdomen are banded alternately black and tawny (male), or reddish orange (female), except the first, which is white. The tuft is of the same reddish tint. Beneath, the wings are coloured almost alike, except that the brown is almost wanting, black and yellowish-white being the prevailing tints; the tarsi or feet are remarkably long, and have a white spot on every joint.

The caterpillars live on grass and herbs in the fields about October and November, the moths flying among the stubble in considerable numbers, if one passes through on a warm day from February till April, but unless disturbed they scarcely are seen. They are shy, dart swiftly to longer or shorter distances, and settle always on some low plant very close to the ground, where their peculiar tints contribute considerably to the difficulty of spotting them.

*Pinara cana*, Walker, is a much larger and stouter insect (at least the female) than the last, measuring above three inches from tip to tip of the extended forewings, which are rather narrow and somewhat pointed. Head and body are of a uniform yellowish tawny tint. The body is one inch and a quarter long, one third wide, almost as thick, also very blunt behind. The trunk is directed forward, promiscuously stout, and tapering, the point rounded. The antennæ are shorter than the thorax, black, but reddish beneath at the end, and finely pectinate. The forewings have the same colour as the body, with a narrow band of blackish lunules across the middle and parallel with the border. Close to it, and toward the border, is a row of seven small dark dots in a direction from the base of the band at the inner margin towards the tip. Near the base of the wing is a short elbowed dark bar, and between it and the first-mentioned a small, round, black spot. The hindwings are orange tinted. Underneath the wings are tawny, a little orange showing in the middle of the first pair. Corresponding with the middle band of the forewings above there is a curved band beneath, black near the front, then brownish, but not reaching the margin. A similar bar, also curved, starts in the middle of the front margin of the hindwings, but does not reach the middle. Two blackish dots are placed between the bars and the border of both wings. The legs are short, and very hairy. The male is scarcely more than half the width of the female; the antennæ are very short, and broadly comblike, the combing brown. The thorax and forewings are rather darker, the markings similar, but more indistinct, the hindwings greyish-brown. The abdomen at the basal two-thirds is blackish brown, the tuft tawny.

A nearly full grown caterpillar was received on July 19 from Port Germein, and fed on leaves of Eucalyptus for a day or two. It was nearly two inches and three-quarters long, brown, with a black, oblique triangular patch on the side of the sixth segment and several near the base of the two widely separated horns at the posterior extremiiy. It formed its cocoon—which is whity-grey, cylindrically oval, one and a quarter by five-eighths of an inch, and the silk pasted closely together—by spinning between the gum-leaves, and hatched on October 10th. Another cocoon was obtained in the Adelaide Park Lands on the 5th of September. The wings appeared on October 11 following. The eggs are globular, but flattened below, about one line wide, and greenish grey.

*Pinara* sp. This is a rare kind, of three and a half inches span, uniform pale yellowish grey colour above and below, and only a small round dark brownish spot near the middle of the forewings. The cocoon is darker, looser, also much thicker in the middle than that of the last. It was obtained on March 3, and hatched about the middle of April. The male has not yet been seen by the writer.

*Oenosanda Duponcheli*, Walker, is an example of great difference between the male and female in size and colouration. The latter is two inches and more wide from tip to tip of the forewings, the former only about one inch and a half.

The female has the head and thorax densely covered by long silky hairs of pale grey or white. The antennæ are bristle-like and extend beyond the thorax. The wings are silvery white; the forewings have a broad black stripe from the base to the margin near the tip, with a small disconnected round dot just at the latter, and an oblique bar from the base to the inner margin. Over the stripe are scattered solitary pale yellowish scales, and a small round white spot is seen just beyond the middle. The abdomen is black, with four narrow orange cross bands, and the last segment bears a more or less broad dense grey tuft. The underside of the wings is greyish, and unmarked.

The male has head and thorax dark brownish and ashy grey, with a short, broad, whitish bar across the middle of the thorax. The abdomen is ringed alternatively black and orange, of nearly equal width, ending in a flat orange tuft. The forewings are ashy grey with numerous small round black dots and reticulations of fine silvery scales. The only part reminding one of the female is the white spot beyond the middle and the silvery white hindwings, without marks. The legs are densely covered with grey hairs, among which also the short comb-like antennæ are hidden at rest.

The caterpillars live apparently upon the leaves of rather tall eucalypts in the summer months, whence at maturity they descend, and burrow in the loose soil around the base and form a small cavity, or spin a loose cocoon under the bark. The moths appear in April in the early afternoon and pair at once, the males dying after the act and the females depositing the eggs under loose bark, covering them over with a thick layer of the hairs of their legs and chest, when they also die without taking any food. The whole period of life for the male imago is completed in from one to two hours if allowed to pair; that of the female is much longer, but probably under 12 hours. On the 20th of April, about 3 p.m., I found a large number of them on the footpath and among the grass under some tall *Eucalyptus leucoxylon*, the females being much more numerous than the males, and took some 10 or 12. Three hours later all the males were found to be dead and the females actively depositing their eggs and covering them up. Most of the specimens were spoiled through this action. The moths are but very little less sluggish than the common silkworm moths.

For the names of several of the above insects I am indebted to Mr. E. Guest, of Balhannah, who kindly identified them for me, which I hereby beg to acknowledge with thanks.

The Lithosiidæ or "Foot-men" embrace mostly small, delicately winged species with very thin antennæ, comb-like in some genera, plain in others. The wings, especially the forewings, are long and narrow, overlapping and enfolding the abdomen at rest. The larvæ are warty and have a small round head. Those of European species are said to feed upon lichens; ours, at least the more promiscuous species, have selected a less harmless diet. The members of this family are represented in all the five continents, range from Sweden to New Zealand, while some species even extend nearly as far.

*Nyctemera* (*Leptosoma annulata*, Boisd.) *N. amica* White, is one of the larger species and the commonest in South Australia. In size it varies from under one and a half inch 'to over one and three-quarters in expanse of wings, and about five-eighths of an inch in length. The body of the male is slender, that of the female (which is always the larger) rather stout. The prevailing colour is dull black. A band on the face, a small spot behind each eye, another at the base of each forewing, the narrow edging of the collar, broad bands across the abdomen, and the apex of the latter are yellow, as well as two broader and two narrow streaks on the thorax, the latter sometimes almost white. The forewings have an oblique yellowish-white band beyond the middle with tortuous outlines; the border and the basal half of their hind margin are bordered narrowly with white or yellow. The hindwings have a nearly round white spot beyond the middle and are fringed dull yellowish. The legs are streaked white and yellow, the thorax underneath is spotted yellow, and the bands of the abdomen are whitish. The wings are more brownish below but have the same band and spot as above. The antennæ are pectinated to beyond the middle and are black.

The larvæ are black, with some brown marks and are covered with long tufts of fine black hair, that near the head and tail being the longest. The moths fly by day only and the females lay their eggs on the stems and stout twigs of *Senecio hypoleucus*, *S. lautus*, and other species; some even pass over the winter in some hiding-place and fly during warm days. The eggs hatch from about August to the end of September in such number that the whole foliage of their foodplants gets destroyed, especially in gardens. On a climbing species (the ivy-leaved) and a single shrub of *Senecio hypoleucus* in my garden I collected and killed many hundreds and finally had to eradicate the plants to get rid of the pest. When mature the larva spins a small rather loose cocoon fixed on a twig or the underside of a leaf and the very active moth appears in from ten days to a fortnight, the moths appearing first about the middle of September and continue flying till January or later, gradually becoming fewer after October. The wings are worn flat, sloping backward, and not much overlapping.

*Lithosia bicosta*, Walker, is a small moth, and not very common, frequenting the hill districts. Its body is slender, and less than half an inch long; the wings measure about one inch and an eighth (or a little more) across. The head and collar is orange above, the eyes, forelegs, feet, and a band across the front of the thorax are black, the antennæ brownish and not pectinated. The thorax is dark, the abdomen yellowish grey. The forewings are narrow, and ashy grey, the front margin narrowly orange, succeeded by a wider silvery white streak, and the border has a pale fringe; the hindwings are pale greyish yellow, without marks.

The moths fly during November and December in the late afternoon, move somewhat heavily, and, when captured, fall and remain motionless for some time in the net or box. The larvæ have not been observed.

*Scoliacma bicolora*, Boisduval, is of about the same size as the last, but red and black in colour. The head, collar, a short stripe on each side of the thorax, the tibiæ of the hindlegs, the extremity of the abdomen, the basal half and all the margins of the wings are rosy red, the remainder of the body and a large roundish patch near the apex of all the wings black.

The larvæ are dark greyish and hairy; they feed on *Senecio hypoleucus*, and perhaps some other composite plants. Occasionally they are very numerous; thus I found them in hundreds on *Senecio* shrubs near Mitcham, on the 25th October, 1885, in all stages. The pupæ are only enclosed in a few threads of silk lightly fixing them to the plant in a sheltered position. The moths issue from their shell in the morning between 9 o'clock and noon, the operation only taking a few minutes, and fly from that time till about 5 p.m. Their wings, when at rest, overlap much, and lie nearly parallel.

*Deiopeia pulchella*, Linné, is a larger insect than the last, and its hindwings are much wider than the forewings, which are narrowly triangular. Body and wings are of a creamy, bluish-white colour. The head has four round black dots above and the thorax nine of various form. The antennæ are bristle-like. The forewings have a number of small, angular, red spots, and scattered between them a number of small, roundish black ones. The hindwings have the tip, the narrow border, a larger spot adjoining the latter, and two small spots at and near the middle of a more or less intense brownish black.

This species is sometimes rather common in stubble-fields and grasslands, flying heavily when disturbed, but otherwise seldom seen on the wing. On October 28, 1885, I met the larvæ and moth at Belair, in the Mount Lofty Ranges, on and about *Erechthites arguta*, and it probably also feeds upon other species of that genus. It has, perhaps, the widest range of any of the Australian lepidoptera, being reported from the north of Sweden, is at home in Germany, India, throughout Australia, and probably extends to Tasmania.

The LIPARIDÆ are distinguished by short antennæ, usually comb-like in the often slender-bodied and much smaller males, while those of the females are either saw-like or quite simple. The latter are sometimes wingless, at others amply winged with thick bodies, which often bear a dense tuft of hair-like scales at the tip of the abdomen. Their wings are large and dull coloured. The larvæ are often densely covered by long hairs, or have projecting tufts of such. They are sometimes destructive to trees.

*Teara tristis*, White, presumably our "Processional Moth," is from one inch and one quarter to one inch and a half in span of wing, the body not extending to the hind angle of the hindwings. The head and thorax are yellowish brown, the abdomen black, with some white marks and a large yellowish or rusty tuft. The antennæ are broadly pectinate and black. The forewings are brownish, the middle more or less white, with a small oval yellowish spot in the middle surrounded by a black ring, beyond which an indistinct dark bar is frequently apparent. The front margin is black, with scattered yellowish scales, the border marked by a double row of small round white spots, separated by a fine black line and black veins. The hindwings are black, with a broad yellowish fringe.

The larvæ are dark and covered with yellowish-grey hairs of different length, some of which attaining, when the larvæ is mature, nearly an inch in length. The moths fly in October and November, and deposit their eggs, which they cover with hairs from legs and tuft, under loose pieces of bark of gumtrees—chiefly White gum (Euc. leucoxylon) and Peppermint (Euc. odorata)—where they remain over the summer and hatch early in autumn (April to June). The young of some species proceed to the highest branches of the trees and construct a common silky nest fixed between twigs, and of a roughly globular form, but pointed below, and from four to six inches in diameter. Within this they retire by day, while at night-time they scatter over and feed on the leaves of the branch upon which the nest is situated. They do this in a quasi-military style, going and coming in procession.

After several moults the nest becomes filled up with the cast-off skins and excrements, when they cease to resort to it, instead of which they assemble and form large roundish heaps in forks of the branches, at the base of the trunk, or among tufts of tall grasses. Sometimes in places where trees are scarce, as many as a dozen nests may be seen on a single tree, each inhabited by a hundred or more of caterpillars, when they quickly strip it of foliage. Then, or if the food does not suit them, they leave it in a body and travel in procession to another tree, sometimes a hundred yards or more distant One usually leads, but quickly the column is increased to three or four abreast, each touching its neighbours, and moving quickly and rhythmically.. Battalions extending twenty to fifty feet are sometimes seen, presenting a most ludicrous aspect when on the march during the early forenoon or late afternoon. If one be touched the whole column stops motionless with bristling hairs for a few minutes; if one or more be removed, the halt is a little longer; the gap is filled by the front rank backing and the rear rank moving forward till they touch, and then proceed; those removed either wait till they can join the rear, or join on to the flank if there be two or more stragglers.

The writer once observed a small double column when one of our native Tarantulas (Lycosa sp.) came forth from its hole in the ground, stood still for a minute or so beside the moving host, then with a sudden spring seized one of the caterpillars, inflicting a bite behind the head. Getting astride over it, it dragged the caterpillar close to the entrance of the burrow; letting its prey go, the spider entered first backwards, and then seized the caterpillar, now dead and motionless, and dragged it in after itself.

The mature caterpillars are obout two inches long, and rather stout. A resting column of them looks as even and uniform as a strip of raw grey cowhide, for which many a novice has mistaken it. The hairs being poisonous—at least the shorter ones—no bird touches them, and were it not for ground spiders, some Ichneumon wasps, &c., they would be formidable foes to the forester; as it is, they seldom do much damage.

Some species of the genus construct no nests, but when young congregate under loose bark, in hollow branches, or under overhanging stones. When full-grown all separate, more or less, spin each a cocoon of silk under loose bark, and change into a smooth, brown, chrysalis. The moths are sluggish by day, but fly actively at night, when they are sometimes attracted by the lamplight.

There are several species of this genus in South Australia, some so rare that they do not possess the social habits of the commoner kinds.

*Darala ocellata*, Walker, is a much larger insect, the male measuring two inches across the wings, and the bulkier female nearly three-quarters of an inch more. The head, thorax, and antennæ of the former are tawny, the wings and abdomen also, but paler, with a silky lustre. The forewings of both sexes have an oblong black spot near the apex of the middle cell, and another near the base; those of the male also a scarcely perceptibe, narrow, and curved darker transverse bar, bordered whitish beyond the farther spot, and a still fainter one across the hindwings, which also are marked by two minute darker spots. The female is much darker, the head pale, thorax and base of wing dark-brown; the transverse bars are much wider, and bordered white on both sides. The front margin is whitish, and the border marked by a narrow, dark line, scolloped inwardly. On the underside the wings in both sexes are of nearly uniform tint, but the pairs of spots assume the form of black rings with a white centre. The caterpillar (not observed by the writer) spins an oblong cocoon of grey silk, loose outside, leathery inside, from which the moth emerges in December. A female was obtained alive on the 16th of that month from the Mount Lofty Ranges. The larva (or chrysalis) is attacked by a small black Ichneumon, with orange legs, and the whole body spotted white. A cocoon obtained in March produced a number of these parasites; it was, in fact, quite choked with their little oval cocoons. They emerged in December.

This moth, though not rare, appears not to be gregarious in the larval state.

Mr. E. Guest informs me that the larva of *Spilosoma fulvohirta* "is very hairy, of a dark reddish-brown colour, curls in a ring when touched, and feeds on many low plants and shrubs, especially on what is known as wild broom. The children call it the 'Woolly Bear.'"

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The PSYCHIDÆ, or CASE-MOTHS, form a very remarkable family on account of their larvæ inhabiting silken cases of various form, and outwardly either protected by fragments of leaves or twigs to a greater or less extent. The moths themselves vary greatly in shape, and it is suggested by Walker and others that they may belong to various families.

The males alone are furnished with wings, and are swift, restless fliers, while the females are wingless, and never leave their habitation, but are fertilised therein, deposit their eggs or emit legions of tiny living larvæ, and die. The males are of small or moderate size, have broad, often thinly clothed, or wholly transparent wings, and broadly pectinated antennæ; those of the apterous female being simple. The prevailing colours are black, brown, and white or grey.

When the young larvæ are hatched they descend from the pendulous case by means of a silken thread till they meet with a branch or leaf, upon which they feed. Soon they spin for themselves a silken case open at both ends, which they never leave, but drag with them in their search for food and shelter, enlarge it successively as they grow, and within which they can turn round. During periods of rest they fix the case firmly at the upper end by strong silk threads, which they cut off when they want to move on. Their growth is very slow, and their appetite dainty, but not ravenous. They, therefore, require many months before attaining maturity, and again several months elapse before the imago emerges from the chrysalis, which is also harboured in the same case.

*Psyche*, sp. This tiny moth is under an inch in span of wings. The forewings are ashy grey, marked with short black bars and black and white spots; the hindwings brownish grey, without spots. The face and top of the head between the large black eyes are white, the antennæ light brown, very slender, and finely pectinated, and nearly as long as the body, viz., three-eighths of an inch. The thorax is dark brown, with a patch of white behind, and the abdomen grey, as all the underside. The larvæ live in nearly cylindrical cases, slightly tapering rearward. At the front they are about three-sixteenths of an inch diameter, one inch and a half long, and composed of five rings of equal pieces of thin twigs fixed lengthwise, the hindmost ring, which is the oldest, being shortest, and the foremost and latest the longest. The latter is about two-thirds larger than the former.

Some cases were received on February 10th from Bugle Ranges, and the moths appeared on the 20th of the same month.

The pupa is almost cylindrical, slender, five-eighths of an inch long, and of a light brown colour, with darker head and eyes. The food plant of the larvæ is *Bœckia Behrii* and one or two other myrtaceous shrubs of like habit. These plants are usually called "Broom bushes," in popular parlance. The larvæ have not been studied, but the cases are found occasionally in great numbers.

*Thyridopteryx Huebneri*, Westwood (*Oiketicus*, Westwood), the "Ragged Case Moth," forms elliptical cases tapering at both extremities; of tough silk, and protected by rather broad, irregularly-shaped fragments of leaves, also bare leaf-stalks, which are fixed at the upper extremity only. They have thus a very ragged appearance, are about two inches and a quarter long and nearly one inch thick in the middle.

The male, according to Walker, is black, densely covered with hair-like scales; the antennæ are yellow, the wings transparent with white veins and black hairs; the front margin or costa of the hindwings is black at the base. The larva is dark, having the head and three succeeding segments pale yellowish with many black dots, flesh-coloured along the sides and the prolegs, and the upper part of the last segments reddish brown.

The male pupa is elongated and shining black; the second, third, and fourth segments of the abdomen bear each five bristles. The female pupa is thick, and has the first four segments of the abdomen ridged (Cat. Brit. Mus., p. 960).

The larvæ live and feed upon eucalypts, such as E. oleosa, uncinata, leucoxylon, in mallee scrubs and hill regions, and are not very numerous. Of two cases received from Yorke's Peninsula on the 29th of January the young were emitted on the 14th of the next month.

*Thyridopteryx (Oiketicus) Herrichi*, Westwood, the "Six-ridged Casemoth," forms leathery silk cases of whitish or brown colour, pointed at both ends, and strengthened by *six* prominent longitudinal ridges, without any other protection.

The male, according to Walker (Brit. Mus. Cat., 960), is black and densely hairy; the head and front part of the thorax ashy; the antennæ dark blackish brown; the wings transparent, with blackish frontal margin and white veins; the scutellum is yellowish. The female is thick and brownish red, with five black bands across the abdomen.

The larvæ live upon eucalypts, and are very slow and dainty feeders. They are black, with a pale yellowish head. Three young specimens, with the case under an inch in length, were received on the 25th of May, and successively fed with leaves of red gum *(E. rostrata)*, white gum *(E. leucoxylon)*, and manna gum *(E. meliodora)*, to all of which they had no objection, provided the leaves were fresh and healthy. One died, the case of the others is now (July 23rd) about twice the original dimensions and about half grown.

*Clania Lewini*, Walker, lives upon the species of Casuarina known as the "Bull-Oak," in the South-East *(Casuarina glauca)*, which there, and more so in North-Western Victoria, covers extensive tracts almost exclusively, or at least prominently, as a low forest tree.

The male moth scarcely exceeds one inch in span of wings, and half an inch in length of body. The thorax is stout, and is, as well as the rest of the body, black, with long brownish hair in parts. The wings are transparent, except near the base, where they are covered thinly with brown, black, and grey scales intermixed. The case of the larva is almost cylindrical, tapering slightly towards the front and more, and for a longer distance rearward. The silk of the interior is white; outside the case is closely covered with small fragments of the surface of the bark, rendering it almost undistinguishable on the stem or branches of the tree. Beyond the middle of that of the male moth a thin twig (one and a half inches long) is fixed, projecting half an inch beyond the end of the case.

*Entometa ignobilis*, Walk., is by far the commonest, and at the same time most remarkable, of the indigenous species of this family. It is commonly known as the Stick-Case Moth, from the singular habitation the larva constructs and inhabits. Prof. McCoy, besides the description of this and the following species, has figured both well (inclusive of their transformations and dwellings) on plate 40 of his Prodromus of the Zoology of Victoria, to which interested readers are hereby referred.

The female is unwinged, of the form of a thick and short, whitish grub, and never quits her case. The male is dull brown, the wings paler, the first pair being marked by a round black spot near apex. The antennæ are doubly but rather narrowly pectinated, tapering to the tip; the abdomen extends beyond the hindwings. Its habits are extremely lively, dashing itself quickly to pieces when emerging from the chrysalis in a box, and seldom, if ever, is met with outside by the collector.

As uninteresting as the perfect insect is, so remarkable is its larval development. The wingless female lays no eggs, but emits live larvæ, which are scarcely an eighth of an inch long, and hairy. These let themselves down by a silken thread from the pendant case of their mother, till they touch a leaf or branch, or even the ground. The writer has frequently seen them by scores or hundreds leaving the cases collected for breeding purposes, before he learned to distinguish the female from the male dwellings.

They immediately, upon finding suitable food, viz., either the Golden Wattle, or various Eucalypts, begin life by spinning a delicate bag of silk for themselves to travel about in, and which they enlarge to suit their growth. When about half an inch long this bag is still unadorned by any extraneous substances, dirty grey, and tapering towards both ends, either of which is open, but drawn tightly together when the larvæ is at rest. Then the caterpillar begins to attach to it small irregular pieces of leaves or leafstalks by one point only, which, when completed, gives the thing a very ragged aspect, and one would hardly recognise them as the same species that inhabit the stick-cases.

When about an inch long, and most probably after the next moulting, the caterpillar finds its dwelling not only too tight, but also insufficient for its protection. After fixing it securely by a stout strand of silk to a twig, &c., the larva slits the whole case open from end to end, and on the side of the twig. Beginning at the top, it fixes the twig in the seam, bites off the projecting end at top, then fastens a thread of silk below the lower opening, and severs the twig between it and its case, which, in falling, is held by the silken fastening below the cut. If the twig is suitable the operation for a second length is at once repeated; if not another of nearly equal thickness is sought for, until the whole case is surrounded by pickets of nearly equal length. The operation described is usually, it seems, commenced late in the afternoon and is complete before next morning. Opportunities to observe this are rare for collectors, unless living in the bush. The last time the writer had a rarely good one was about the end of November, 1887, in the scrub near Murray Bridge, when they were seen in numbers and in all stages.

The larva carries this stick-case always with her only protruding the head and thorax with the three pairs of true legs used for locomotion from leaf to leaf or branch to branch. While feeding, a temporary fastening to some point secures it from a fall at a sudden alarm. At those occasions it withdraws itself with extreme rapidity, and at the slightest disturbance, till it feels reassured again. When contemplating a longer rest, a stronger cable is used. These fastenings are bitten through when removal is desired. The caterpillars are rather slender when fully extended, black, with yellow and white spots and rings, but can contract themselves very much on the one hand, while on the other they can turn round easily within their dwellings and use either opening for the exit.

At the last enlargement the larvæ which are destined for males usually allow the one or two sticks added to be much longer than the others. When about to change into the chrysalis it fixes the case to a stout twig by passing stout silk strands around it, or secures it otherwise so carefully that it is diffiult to detach it, then turn the head downward, and in that position assume the new form. At the appearance of the imago the wings are at first wet and incapable of flight, while a fall to the ground would either injure the delicate skin or land the helpless infant among the ants, who would make short work of it. The long projecting stick provided by the larva now comes in handy. Upon emergence the young moth climbs down and along it, freeing itself from its swaddling clothes, the chrysalis case, which is dragged out to some length, and remains fixed to show that the inmate has left. Shaking out its wings with a loud hum while clinging to its support they get serviceable in a short time, and away darts Entometa with a headlong rush upon its short tour of love and adventure. The males are much less in number than the females, and besides this the larvæ are so extensively attacked by an ichneumon, mites, and other parasites that it is rare good luck to breed the moth from the cases, though these are sometimes to be seen in dozens upon almost every shrub of their food-plants.

A much larger species occurs about Goolwa and Square Waterhole, the cases being nearly twice as large as those of *E. ignobilis*, but the moth has not yet been seen by the writer. The case itself between the shorter sticks is one inch and one quarter long, and five-eighths inch diameter. Both have three longer and stouter sticks, of which two are much longer or shorter than the third, and at a distance from each other. The shorter sticks measure about 2½ inches, and the longer 3½ and 4½ inches respectively. The ordinary case of Entometa ignobilis measures usually from one to 1¼ inch in length by three-eighths to half inch diameter. Probably also those found feeding on the Golden Wattle (*Acacia pycnantha*) are a different species than those living upon eucalypts.

*Metura elongata*, Saunders, occurs occasionally in the mallee scrub regions of the colony, such as Yorke's Peninsula and the Murray Scrub, but not numerously. There being no specimen at the Museum, the description is culled from that of Prof. McCoy's, in the Prodromus, Decade 4, page 43 and plate 40, figs. 1 to 6 :—The male moth is nearly two inches in span. The head and thorax are orange coloured and densely hairy, the abdomen black, with the three last segments banded orange; it is capable of great elongation. The female is dark grey, the head whitish, and the thoracic segments marked orange on a black ground. The larva is similarly coloured, but has a blackish stripe on each flank. The case is about 4½ inches long by five-eighths of an inch in diameter in the middle, tapering both ways. It is thinly covered by short bits of twigs fixed at the upper end only, the lowest pieces projecting partly beyond the end. From September to November the cases can be found on mallee bushes.

The NOTODONTIDÆ are of moderate or rather large size. The body is thick, extending beyond the expanded hindwings, and covered with rather long hair-like scales, of which those on the front or back of the thorax are the largest, and sometimes form a large tuft. The forewings are rather long, broad at the base, rounded at the tip, and more or less straight in front and rear. The hindwings are much shorter, and more rounded. The antennæ of the males are broadly pectinated, resembling feathers; those of the females vary from less broadly featherlike to quite simple; their length varies from one-fourth to one-half of that of the body. The mouth parts are usually little developed, signifying that the moths take no food. The thighs of all the legs—the first pair of which being usually the strongest—are thickly covered with long hairs.

The larvæ are mostly naked and smooth, with the usual number of legs, but in some genera, as, for example, the European Puss Moth (*Cerura vinula*, Schrank), when the body ends in two bristle-like tails, the last pair of legs is wanting. Such caterpillars bear also a hump or horn upon the forepart. When mature they either spin a cocoon in some sheltered place, fix leaves of their food-plant around themselves by silky threads, or undergo the change into the chrysalis in some sheltered hollow space with scarcely any covering.

*Damima Banksia*, Walker, measures two inches and a half from tip to tip of the forewings (the male less) and the body an inch in average. The head is small, and, with its long hairs at the top, brownish grey; the eyes black, or brown with black spots; the almost simple antennæ are rusty orange. The scales of the thorax are long, with a broad tip, and some black intermixed with white and brownish ones; on each side, at the shoulder, are two rounded white spots; long yellowish hairy scales cover the base of the hindwings and the posterior part of the thorax. The first four segments of the abdomen are orange, each with a tuft of scales on either side, margined black; the last are black, with long yellowish-grey scales. The long grey scales of the legs almost conceal them and the body; the underside of the abdomen is deep velvety black.

The forewings are ashy grey, with thinly-scattered larger white and yellow scales, of which the latter are the fewer. From the middle of the costa an angulated narrow stripe extends towards (but does not reach) the border, and two or three short, indistinct, transverse black bars reach from the middle of the wings to the hind margin. The narrow fringe is alternataly white and grey. The underside and the whole of the hindwings are uniformly greyish-brown, except the long yellow hairs at the base and inner margin, and the pale fringe.

The caterpillars live upon Banksias (Native Honeysuckle), Hakeas, and Grevilleas, and vary in tint according to their food. When mature they are about two inches long, cylindrical, and smooth, except the last two segments, the first of which bears a low hump and short erect horn, the other short black bristles, thinly scattered in rows; small claspers are present. The general colour is a dirty green or reddish, with a paler yellowish medial stripe, transverse rows of round yellow dots on each thoracal and abdominal segment, except the last; the latter have also narrow black transverse bars above (on which the yellow dots are placed) and oblique pale bars laterally. The underside is reddish or brownish, except the mouth parts. The claws of the true legs, the three segments of the thorax, and a short broad bar on each of the abdominal segments (except the last), and extending on the outside of the false legs, are black, with some yellow dots. When mature they spin leaves together with the thin pale-grey cocoons.

The chrysalis is dark-brown and glossy, about an inch and a quarter long, and rather sensitive for the greater part of its existence. From a mature caterpillar received on the 27th of March, and which spun its cocoon next day in a box, the moth emerged on the 6th of May, thus taking about 38 days. Another spun itself in on the 6th of December, and the imago emerged on the 31st of the same month, only taking some 25 days; the shorter period is most likely due to the much higher temperature prevailing. These observations also denote that there are at least two broods in the year.

Usually this moth is not very common, but of late years it has been reported from various localities that *Grevillea robusta*, introduced into gardens and parks from Western Australia, has been attacked by numbers of its caterpillars, so as to almost denude the trees of foliage, which is, no doubt, due to the great reduction of native insect-feeding birds.

*Philomacra senex*, Walker, occurs frequently in the hill districts, such as the Mount Lofty ranges, during autumn and winter, *i.e.*, May to August. In size this species exceeds the preceding but slightly, but the body of the female is much bulkier. Head and thorax are black, the latter with two diverging white stripes. The antennæ of both sexes are blackish, broadly pectinated, and rather long. The abdomen, above and behind, is ashy grey, blackish along the middle of the back. The mouth-parts and legs are thickly covered with brown and grey hairs intermixed with a few white ones. The feet are black, each joint and the tip being set off with a narrow fringe of white. Both wings are dull-brownish, the forewings darker, with some indistinct blackish areas, and over all, more or less unequally distributed, are scattered pale scales, producing an appearance as if covered by hoar-frost.

The caterpillars appear to live upon the leaves of the stringybark and similar leaved Eucalypts, but have not come under the observation of the writer.

*Hylœora caustopis*, Meyrick, measures over three and a half inches in span of wings, and one and a half inch in length of body, which tapers slightly, but ends bluntly. Head, thorax, and two first pairs of legs are densely covered by long hair-like brownish-red scales, broader at the tip, and this part mostly black, but mixed with some white ones. The long scales form two prominent, pointed, and erect tufts at the inner base of the antennæ, and a large dense one on the back of the thorax. The abdomen is long, margined by flat tufts of hair, and of rusty-yellow tint mixed with blackish at and near the end. The antennæ are long, pointed, broadly pectinated, and yellowish. The forewings are dull blackish-brown, with a broad, indistinct, pale band extending obliquely from the tip towards the basal curve of the hind margin. A short white stripe extends for half an inch from the base along the midrib to a narrow, black, oblique bar, and beyond this continues as a paler brownish mark along the eighth vein. The space between this and the last vein is dull bluish, interrupted by indistinct, narrow, black markings. The scales of these areas are very much broader than any others. The border of both wings is prominently crenated. The hindwings are yellowish brown, paler near the base. The underside of the forewings and the costa of the hinder one is nearly of the same tint; the border of the former is hoary, and the larger part of the latter yellowish-white.

"The imago may frequently be taken during March (in the Mount Lofty region) sitting on posts and saplings, but always only an inch or two from the ground. The larvæ is large, whitish green, with a raised crenated ridge on each side of the back. It feeds on various Eucalypts, preferring, I think, E. leucoxylon" (Mr. E. Guest).

Another species occurring near Adelaide is *Hylœora bicolor*, Walker.

Another *Hylœora* species resembles the first in general tint, but is smaller, and without pale markings on the forewings. The hindwings are of a dirty yellowish-white, with a faint dark edging near the border. One specimen, the smaller of two in the Museum, was bred from a chrysalis received from Unley, near Adelaide (packed in by the sender as a larva), in March, and of which the imago appeared on the 12th of April following; the second, much larger specimen, came from Mount Bryan on the 2nd of November. Both are females, and have the antennæ simple. The underside of both pairs of wings is ashy grey.

The LIMACODIDÆ (COCHLIOPODIDÆ, Boisd. and Kirby) comprise small and very moderate-sized moths with very hairy, thick bodies, the abdomen not extending beyond the hindwings. Their antennæ are slightly longer than half the forewings; the palpi small, slender; the tongue is formed of two soft threads, and the short legs have very hairy thighs. The larvæ are short and thick, in shape very unlike other caterpillars, and have short sticky pads instead of legs. The pupa is very soft, the limbs being separate from the body, and the whole enclosed in a hard cocoon with a lid. The moths fly by night, and in South Australia are seldom met with by day.

The genus *Doratifera* (Westwood) is the principal, if not the only one in South Australia, with one very common and one or two rare species. It is distinguished by the antennæ being longer than half the body, the hind tibiæ ending with two minute spurs; the wings broad, rather short, straight in front, rounded at the tips, and oblique behind. The male is much smaller than the female, its antennæ being comb-like to the middle, then toothed to the tip (those of the latter are simple). The wings are also almost bare of scales and unmarked. The male of the following species has a very dark body with red spots on the thorax.

*Doratifera* (*Limacodes*) *longerans*, White, is from seven-eighths (male) to one inch and a half in span of wing. The female is very stout in body; the head and thorax are brownish-yellow, the abdomen greyish-brown. The antennæ are very slender, paler than the other parts, and with a small white tuft at the base. The forewings are pale brown, with a broad pale grey border, succeeded by a broad indistinct oblique dark bar, which does not extend much more than half way to the hind margin; the base is nearly as dark, fading into the lighter tints like the bar. The whole is rippled by many narrow, pale, wavy crossbars. The hindwings are without marks and of a dull pale brown. The underside is brown, deepest near the base. The long hairs of the femora of the legs are dark brown, the tibiæ of the forelegs white outside, and the feet banded white.

The caterpillars are about three-quarters of an inch long, green, and foursided, being quite flat below and nearly so above; the strongly cross-ridged flat sides slope upwards, so as to make the back much narrower than the underside. Along each side there are ten soft bristlelike appendages, the last being longest. Overarching the head is a high narrow ridge bearing two antennælike horns. The next two segments as well as the two last bear each two papillæ, scarcely observable when at rest, but from which are projected at the least alarm a mass of sharp yellow spines, hedgehog fashion. If the skin is brought rudely into contact with these, a continued itching, accompanied by some inflammation, is said to be produced, and varying in intensity according to the sensitiveness of the particular person. The caterpillars live upon the leaves of various Eucalypts, such as *Euc. leucoxylon* (White gum), *rostrata* (Red gum), &c., and even Acacias. They attain their maturity about January, when they proceed to the shelter of some loose bark on the branch or trunk of their food plant, or select some spot where they fix themselves and begin to spin a soft grey silken cocoon. When this is finished they saturate it gradually with a cementing fluid, at the same time contracting in length and expanding in width they slowly turn round and round, head upwards, until it becomes of sufficient consistency to retain its form. Then the caterpillar cuts a circular cincture near the top of its now perfectly oval cocoon just large enough to allow the moth to emerge. This lid-like piece is held apparently only by a few threads on one side and the cement.

The pupa itself is oval, and fills the hard smooth cocoon almost completely. It is brown, the thorax smooth, with several short black longitudinal ridges; the mouth parts are also black. The antennæ, legs, and wings are entirely separate from the body (fore and hindwing, though, are in the same case on each side), even the large tufts of hair on the sides and underneath the abdomen appears to have separate casings.

From a case obtained on the 29th of January the moth—a male—appeared on the 6th of April. A female moth, the case of which was obtained early in February, appeared on April 16th. On the other hand some silky uncemented cocoons were secured on the 15th of October, some of which had their cocoons completed next morning. The caterpillars seldom cause any noticeable damage.

*Doratifera* sp. The female is considerably smaller than the above, and the body of a clear yellowish snuff brown. The forewings are somewhat darker, with white veins, a moderately broad, well defined white border, a blackish double bar near the base from the midvein to the hind margin, and a large intensely black spot at the end of the middle cell, besides several small ones beyond. The whole of the dark area is crossed by numerous narrow, shining, straight brown bars. Beneath the long hairs of the legs are pale yellowish-brown (the forelegs and feet with some white), and the abdomen dark brown.

A single cocoon was received from Unley, near Adelaide, in March, the moth appearing in April.

*Doratifera (Anapœa) denotata*, Walker, occurs rarely in the forests of the Mount Lofty Ranges.

The SATURNIDÆ comprise the largest lepidopterous insects of the world, there being some which, like *Attacus Atlas* in India, almost measure a foot across the wings. The South Australian representatives, though not nearly of the above dimension, attain a respectable size, and rank among the largest of the order for the continent.

The body is thick and woolly, and does not reach beyond the hindwings, but is often much shorter. The head is small, the mouth-parts abortive, the antennæ of the male featherlike, and the legs woolly. The wings are large, the front pair being triangular, with a round or angular eye-spot in each, the centre sometimes transparent, and always surrounded by more or less distinct rings of different colour. The larvæ are thick, without hairs, but warty or spiny, or both. The pupa is protected by a more or less thick silky or felt-like cocoon. All the species yielding a silk of commercial value (except the true silkworm moth) belong to this or the following order:—

*Antheræa Eucalypti* (Boisduval?), with two or three other species, is fairly common in South Australia. The span of the wings is from under to over five inches, and the body about one inch and a quarter in length. The colour is reddish brown, notably of the hindwings, which stretch considerably beyond the body. The thorax is greyish in front. The costa or front margin of the forewings is greyish, and much bent near the tip; the border or outer margin is almost straight with the females, but concave with the males; the hindmargin is straight. The tip is pink; from near it a very faint and narrow darker straight line extends to the hindmargin, and nearer the middle the rather large circular eye-spot of a pale pinkish tint and a narrow brownish border is placed; its transparent centre is very small. The hindwings are very hairy near the base, and have a large eye-spot in the middle, the middle of the same colour as the wings, surrounded by a black ring, a bluish-white lunule on the upper side between the middle and the ring, and a very minute transparent centre. About midway between the eye-spot and the border a narrow, double brown and white slightly wavy band runs parallel to the latter from the front to the hindmargin.

The caterpillar is about three inches long, as thick as a finger, with very prominent segments. The colour varies from pale to brownish-green, with bright-coloured spots (red, &c.), the colour of which varies with age. They live upon various Eucalypts, and are solitary. The dark-brown pupa is enclosed in an oval cocoon, measuring one inch and a half by seven-eighth of an inch, grey, and composed of very strong silk, cemented together and usually placed between some leaves or loose bark and the trunk of a tree. From the cocoon (spun between leaves of *Acacia retinodes*) received on the first of September the moth emerged on the 24th of the same month.

*Antheræa Helena*, White, is from six to seven inches in span, and it and some other species often taken for the preceding, but its colour is a reddish-fawn tint, paler beneath. The thorax, in front of the costa, is grey or hoary. The forewings have a disjointed brown bar near the base, a small black spot near the tip, from which a rather wide wavy grey band extends to about the middle of the hindmargin, bordered blackish on either side. The eye-spot is orange or pink, with a minute glassy centre and very narrow white and purplish rings. The hindwings are brighter than the others, with a faint band near the base, a distinct dark and whitish one at some distance from the border, and a round eye-spot in the middle, which is similar to that of the last, but smaller. The antennæ of the male are much broader plumose (feathery) than of the last species. Those of the females are only toothed. The underside of the wings is almost uniform in tint, but the eye-spots of the forewings much more conspicuous than that of the hindwings, *i.e*, opposite to what is the case on the upper side.

The caterpillars are found upon Native Honeysuckles (*Banksia marginata*), but also appear to frequent Eucalypts. A cocoon was found spun between the fronds of the Bracken fern (*Pteris aquilina*). This hatched in October.

In Victoria a very much smaller species occurs, entirely absent in South Australia.

## BOMBYCIDÆ.

The BOMBYCIDÆ or Spinners proper are typically represented by the well-known Silkworm Moth, *Bombyx mori*, L., on the one side, and on the other by the European moth, called the Kentish Glory (*Endromis versicolor*, L.), and is divided into two groups, the Bombycinæ and Lasiocampinæ, the latter of which is raised by Kirby and others to the rank of a family. The former is distinguished by smooth or naked larvæ, and the antennæ being comb-like or pectinated in both sexes, while the latter has hairy larvæ, and the antennæ of the male moth only pectinated, those of the female being simple or only toothed. Besides the above, the Bombycidæ are marked by moderate size and broad wings, of which the first pair have sometimes the point slightly elongated (falcate) and the border toothed (dentate).

*Odonestes Australasiæ*, Walker, measures about five-eighths of an inch in length, and one and a half in span, the male being smaller than the female. The thorax is stout and covered with long hairs, the abdomen tapering. The female has the head, the thorax, the base of the wings, and abdomen snuff brown, the posterior end of the latter is whitish. The wings are pale yellowish white, except the front margin, which is brownish. The antennæ are whitish, the teeth blackish. The legs are very hairy. The male is of a uniform red colour, with a rosy tint. Very little is known of the larvæ of this comparatively rare insect, which is usually found solitarily or in pairs sitting on low branches of shrubs or under bark, and is of very sluggish habit.

Another species, and somewhat larger, occurs from March to May in the Murray Scrub, &c. The female is pale yellowish brown, the male reddish brown. The upper side of the forewings is marked by two bands of small blackish dots, one being before the middle and the other nearer the border; those of the female mark the veins some distance. The genus extends to Europe and Asia.

*Porela metastigma*, Walker, and *Distolmia lanceolata*, Walker, are two other rare species which occur in the forests of the Mount Lofty ranges. Mr. Meyrick also places *Pinara* in this family.

The second group, or Lasiocampinæ, are represented by several genera, of which some indigenous ones are remarkable on account of their large cocoons of fine grey or white silk, but mixed with the hairs of the caterpillars to a certain extent.

Among these the genus Lebeda is represented by large or moderately large moths in India, China, &c., and Australia, the latter distinguished, according to Walker, by a somewhat stout body; stout palpi extending beyond the head; antennæ of the male deeply pectinated beyond the middle, then tapering to a point, those of the female dentated; the abdomen of the male extending far beyond the hind-wings. The first pair of the wings of the female are somewhat pointed. The first and second inferior veins are contiguous at the base and the others successively more remote from each other.

*Lebeda obscura*, Walker, is under three-quarters of an inch long and one and a half in span (male), fawn coloured, with testaceous head and blackish abdomen, its tip paler. The fore-wings have three slender, oblique, somewhat undulating, brownish bands. The hind-wings are brown, reddish towards the base (Walker, Brit. Mus. Cat., 1855). Reported from Adelaide, but the writer has not seen it.

On the 6th of January, 1887, the writer found a fine cocoon of pale greyish white silk, with a live pupa, under the bark of *Eucalyptus paniculata*, at Tintinarra, on the railway through the south-eastern desert. It is two and a quarter inches long and over three quarters of an inch diameter. On the 10th February next a female emerged, of a species, of which subsequently several males and females were obtained from Mr. James Hill, Kewell East, N.W. Victoria, who had not seen the cocoons. As I have not seen any description, &c., agreeing with it, a provisional name is attached.

*Opsirhina Tintinarra*, MSS., the Eucalyptus Silk-moth. The male is reddish fawn coloured, has a stout thorax and much narrowed abdomen, the latter not reaching as far as the hind-wings. Its length is about one inch and the span of the wings two inches and three quarters. The antennæ are not very broadly pectinated, and scarcely as long as the thorax. In the middle, but near the costa, is a small blackish spot with a minute white centre. between it and the base a narrow blackish zigzag band; beyond the dot first an oblique, slender, nearly straight, and very faint brownish band, and parallel with it a narrow, regularly scalloped blackish one, which (the first band faintly) are continued across the hind-wing. The female is greyish fawn coloured, with a very stout abdomen extending beyond the hind-wings. The antennæ are slender, serrated, as long as those of the male. The round black dot is larger and more distinct, but the bands much fainter than in the male. The underside of the wings of both sexes is rather paler; the outermost band is present in a series of dots; the discal dot also with another nearer the base in both pairs. The underside of the body is more reddish; the tibiæ of the legs are dark brown outside, and at the kneejoints have a white spot. The silk of the cocoon is very fine, quite loose on the outside, and not cemented, but mixed with some short yellowish hairs. If the moths could be domesticated they might become of value industrially. The caterpillar has not yet been seen by the writer.

At the western end of Kangaroo Island several similarly large cocoons, but bristling with stiff, dark-brown hairs, were found under the dead bark of the sugar gum, Eucalyptus corynocalyx, but unfortunately the moth of the only live pupa obtained emerged during transit and was spoiled.

On the 9th of October last a caterpillar was received from Mr. J. Uren, Windsor, which spun its cocoon the following night. It was soft, between three and four inches long, brown, with long tufts of orange, white and black hairs. The cocoon is nearly three inches long, and one inch and a quarter diameter, oval, and formed of loose white silk, but intermixed with the hairs to a moderate extent. It is the finest cocoon I have yet seen. At this date the moth has not made its appearance.

A tuft-hairy, dark brown caterpillar, with a broad reddish brown band in the middle is sometimes met with among the grass. It spins a small cylindrico-oval grey cocoon, from which emerges a moth with blackish wings, the first pair having four narrow white scolloped bands, partly continued through the hind-wings, which are whitish towards the base and the bands there black. The fore-wings show also two small white discal spots. They belong to this family, but I cannot find a description.

The Cossidæ, Zeuzeridæ, or Goat Moths form a small family, that is, containing a small number of genera, but is widely distributed, and some of the species are represented by a very large number of individuals. As the larvæ of all live in the interior of trees and othar plants, drilling out long galleries while feeding on the wood, and being, moreover, in some species of large and very large size, they rank among the most destructive of the order.

Besides the above habit of the caterpillers, the moths are distinguished by a stout body, especially of the female (or rarely slender), which is provided with an ovipositor to convey the eggs into cracks of the bark, and the abdomen extending for half its length or more beyond the anal angle of the hindwings. The antennæ seldom reach the middle of the forewings, but are usually much shorter and doubly combed in the male; the palpi are very short, the tongue or proboscis is wanting, consequently the perfect insects can take no food; the head is also very small, but the eyes prominent. The wings are thick, and the nerves very strong, especially in front; they are long, rather narrow, rounded at the tip, and covered with coarse scales of grey, brownish, or blackish tints. The cylindrical, fat larvæ are pale, almost smooth, with a few scattered thin hairs; have large, strong jaws, a polished shield in the first segment, and 16 short legs. The segments are prominently developed and slightly tapering rearward. They inhabit the interior of their food plants for several years, feeding upwards, and when mature have arrived within about a twelfth of an inch or less of the surface of the trunk or branch, leaving the thin layer of the bark undisturbed, like lids over their tunnel. The larvæ then withdraw for several inches, and form a cocoon by spinning and cementing together their sawdust-like excrements, within this cocoon they change into the chrysalis. The latter is brown, long, and stout, the last segment furnished with stiff bristles. When mature they push themselves forward by means of their bristles, first through the thin cocoon and along the sloping tunnel, then bursting the thin shell of the bark, push themselves half their length out of the holes. Here the shell remains when the moth has flown, usually with a considerable quantity of fluid refuse matter.

The moths emerge usually about sunset, flying vigorously about in search of mates, and pair, after which the males die. The females deposit their eggs in crannies and cracks, or under loose bark, and then die likewise; few, if any, of the insects survive till next sunset.

*Cossus cinereus* (?) is the largest insect of the order in South Australia, the female measuring three inches in length of body, and over seven in span of wings, the male being about one-fourth less in size. The general colour of head, thorax, forewings, and the end of the abdomen is a lighter or darker ashy grey. On the front part of the thorax are two short diverging bands of black; the posterior part of it, and the first segments of the abdomen are covered with white, the next three or four with more or less black scales. The covered frontal part of the hindwings is white, the remainder in the female blackish brown, in the male almost black; both pairs have the border narrowly edged with white. The long hairs of the legs are pale grey; the long tarsi or feet alternately white and black, and the underside of the body pale greyish white, that of the wings paler than the upper and without markings. The antennæ of the female are very slender and bristle-like, those of the male doubly comb-like, and in both sexes shorter than the thorax; they are worn sloping or root-like when at rest. The hind margin of the first pair is peculiarly curved. The mature caterpillars are cylindrical, yellowish white, about four inches (or more) long by three-quarters of an inch thick, and very fat. They drill cylindrical tunnels many feet in length. The pupa is dark brown, the frontal part being almost black, and shiningly smooth. Most of the abdominal segments bear a single or double ridge crowned with short, stiff bristles. The moths emerge during December, an hour or so before and after sunset, and fly during the night vigorously (resembling bats) about the trees which form their foodplant, viz., Eucalyptus rostrata, or "Red-gum." Those in the Park Lands about Adelaide are very much infested by them, the stems and branches being drilled by numerous tunnels (scores, if not hundreds, in each) of the Cossus, and a near ally, viz., *Zenzera eucalypti*, which is often mistaken for the former. The wings, at first very supple and elastic, gradually dry up, and by the morning are so brittle that the edges are shattered and torn by every contact, hence they become quite unfit for flight, and the insects fall an easy prey to the sparrows and other birds. There is scarcely any doubt that the multiplication of this and other species of similar habit about towns is owing to the absence of owls and other nocturnal birds, as there are but few to be seen or traced in the open forests of Redgum, where birds abound. The larvæ are among those eaten by the natives.

The female of another species of Cossus, and almost as large, was in the beginning of December received from Windsor. It differs chiefly in having the forewings relieved by large roundish spots of white and indistinctly bounded patches of black. More specimens are desired.

The *Cossus* and allied species are to some extent preyed upon by several species of Ichneumonidæ and Braconidæ with ovipositors from three to four inches in length. These serve to penetrate through the lid of the tunnel and the cocoon into the chrysalis, each providing food for a score or two of the large and handsome parasites.

*Zeuzera eucalypti*, Boisd. (?), is a misnomer, as far as the species is concerned which is recognised under this name by entomologists, as it has been ascertained that its food-plants are various kinds of Acacia and not of Eucalyptus or "Gums," and should be changed to "Zeuzera acaciæ." It appears the mistake has arisen partly by mistaking the preceding species for this, and partly by another species resembling it, but really living in Eucalypts.

*Zeuzera* is at once to be distinguished by the narrower forewings being marked by narrow more or less distinct black reticulations, extending in some species also over the hindwings. The above species is from five to seven inches in span of wing, more or less brownish, the thorax grey at the sides, with two diverging black stripes united in front and enclosing a more brownish area. The abdomen is brownish, with greyish bands; the antennæ of the male are broadly, of the female narrowly pectinated at the base, and bare near the tips. The young larvæ are rosy pink, the mature ones very much paler, about three inches in length; they feed downward in the trees (McCoy, Prodromus, III., plate 30). The moths emerge about February. These near Adelaide, and almost certainly proceeding from gum trees (Eucalyptus rostrata), show no brown, except when much rubbed, when the colour of the veins is seen. The pale area along the middle of the forewings is very indistinct, and the black bordering (caused by the reticulations being much broader) forms two narrow bands, one along the front margin, the other distant from the posterior and approaching the former near the apex or tip. The abdomen of the male is almost black, except at the white base (of the female paler), and the whitish bands very narrow.

From North-Western Victoria, the district of the "Bull Oak" (Casuarina glauca), hails another species, from two and a quarter to three inches in span of wing, which has the grey forewings marked by small whitish streaks and numerous black reticulations all over, while the hindwings are white, with a narrow black border. This was obtained from Messrs. Hill, at Kewell East.

From Beltana (north of Port Augusta) a small species was collected by Mr. W. B. Greenwood. The male measures one inch and a quarter, the female one inch and three quarters from tip to tip of the forewings, which are brownish grey, with paler and darker streak-like areas, and marked all over with very fine black reticulations. The hindwings are of the same colour, and also have the same net-like markings. The abdomen is alternately black and white banded and tapering. A pair in a fresh state was sent to the Museum in the early part of March, 1887.

All specimens of this and the following order are very liable of getting spoiled by becoming greasy, as they contain a great quantity of fat. Immersion in benzine for some days is about the best way to restore them.

## MOTHS.

The Hepialidæ are represented by several genera in South Australia, one of which contains species equal in size to those of the preceding family. They rank among the most common and, therefore, most destructive insects in some localities, where they are not kept in check by owls and other nocturnal birds, as for example, in the Park Lands around Adelaide.

The family is distinguished by short, simple, or almost simple antennæ; long and narrow wings, rounded at the tips. The abdomen generally extends beyond the expanded hindwings, and is clothed with flattened hair. The head, thorax, and legs are thickly clothed with woolly hair. The veins and cells of the wings are very peculiar, there being an additional cell along the front margin extending the whole length; the cell in the disk is, as it were, nearly divided into two, and several other characteristics. The larvæ are cylindrical, and much more slender than those of the Cossidæ, have sixteen short legs, warts above, with some stiff hairs, and a shining head and thoracic shield. They live in the ground upon or in roots, form a cocoon in their burrow when mature, and change into long pupæ, which have stiff spines on the segments of the abdomen. The moths fly in the twilight, are unable to feed, and die soon.

The family, and even some genera, extend over all the continents, and the species vary in size from small to very large.

*Hepialus Australasiæ*, Stephens, is the only species of the genus reported from Australia, while in Europe about eight species occur, one of the English ones being known as the Ghost-moth, the others as Swifts. The genus is distinguished by long hindwings, strong feet, the abdomen not much elongated, and the antennæ short and filiform. The above species is yellowish grey, the abdomen and hindwings more whitish. The antennæ are about half as long as the thorax; the wings long and the forewings very oblique along the border. The length of the body is about three-quarters of an inch and the span of wings about two inches.

There are two specimens at the Museum, agreeing fairly well with Walker's description (Cat. Brit. Museum, 1538), except that one is considerably larger, the body much longer and very bulky (filled with eggs), and that both show solitary black scales thinly scattered over the forewings. The chrysalis of the smaller was obtained in the Mount Lofty hills in February, 1885, the moth emerging in the beginning of the following December; the other specimen was captured by the writer east of Gawler on the trunk of a gumtree, on the 27th December of the same year.

*Charagia lignivora*, Less., is rather rare and remarkable, on account of the great difference in appearance of the sexes. The span of the wings of the male is about one inch and a half; that of the female two inches and a half, the length of the body being respectively three quarters of an inch and one inch and a half. The length of the slender abdomen and the broad, subfalcate form of the forewings (the tip extending beyond the general border) are generic characters. The female has the thorax and posterior part of the abdomen dark or blackish-brown, the intermediate part paler. The forewings are brown, with a very large triangular spot of green in the disk, and another irregular one at the tip and border. The hindwings are pale fawn colour.

The male has the thorax black, sprinkled with white hairs, the latter also clothing the head. The wings are grass green, with a narrow silvery white stripe along the front, a similar oblique band from the base to the hind margin, where it is joined by another from near the tip. The abdomen is whitish. According to the observation of Mr. W. Guest, the larva mine the stems of the teatrees (Melaleuca lanigera), the moths emerging in December. The insect is rarely met with.

*Pielus Tasmaniæ*, Stephens, is stout, the blunt abdomen not much extending beyond the hindwings. The body is about one inch and a half long, and the expanded wings of the female measure over five inches. The males of this as well as of the following species are very much smaller, the colour and markings paler and far more distinct, and so much alike that it is impossible to mate them with any degree of certainty.

The female is brownish-grey; the forewings are much paler, with many intricate, narrow, and minute whitish and blackish markings and lines, an irregular dirty silvery stripe in the middle reaching a little beyond the centre, and a rather broad band of similar tint from near the tip to near the hind margin, both surrounded by a very narrow black and whitish border. The palpi are very short, and the border of the forewings is very oblique in this and the following species.

A female was captured on the 28th February, 1886, on Sugar Gums in the Ravine des Casoars, near Cape Borda, Kangaroo Island, another near Adelaide.

*Pielus labyrinthicus*, Donovan, resembles the foregoing very much in size and colouring, but the abdomen is pale, the palpi longer, so as to project somewhat beyond the head; the antennæ, serrated and slender in the female, and moderately pectinated in the male, are blackish instead of brown.

The forewings of the female are blackish gray, and darker than the hindwings (which are brownish near the base), with many intricate paler markings with darker borders. The usual silvery discal stripe and oblique bar are faintly indicated, and the abdomen of both sexes extends much farther beyond the hindwings.

The male varies in length from one inch and a half to nearly two inches, and in span of wings from under three inches to three inches and a half, the body being of the same colour as that of the female, but the silvery stripe along the forewings is very clear, nearly extending the whole length, though narrow, and the oblique bar very narrow and short. The hindwings are pale blackish-brown to yellowish white.

The larvæ are whitish yellow, from four to four inches and a half long, cylindrical, and comparatively slender, the segments being separated by broad and deep saddles. The head is nearly as wide as the body, very hard, and light-brown in colour. They live at first upon small roots, following them up, eating their woody part entirely, till at age they finish with such as thick as a finger, or even much larger, killing it as they proceed. When mature, after a life of several years, they form a perpendicular tube to within an eighth of an inch of the surface, and line it thinly with silk, or simply smoothen and cement the walls; then withdrawing to a considerable depth undergo the change into the chrysalis in a thin soft cocoon. The abdominal segments of the chrysalis have one or two serrated transverse ridges, that of the last, which is bluntly conical, being especially prominent, by means of which and alternately contracting and extending the chrysalis works itself upwards. When the imago is ready to emerge, from April to August, the chrysalis forces the surface covering off in form of a circular concave lid, and pushes itself out for nearly half its length of over four inches. The moths escape late at night or in the early morning. They fly heavily, and the females deposit their hundreds of minute eggs (white at first, but changing soon to a purplish black) among the grass or under the bark at the base of the trees, and soon die, as neither sex can take any food.

The chief food plant of *Pielus labyrinthicus* is apparently the Redgum Eucalyptus (E. rostrata); hence by mistaking the name they are sometimes called "Hepialus Eucalypti."

*Pielus atripalpus*, Stephens (?), is nearly the size of the last, being from four and a quarter to five inches in span of wing. The whole body is of a more or less deep brownish black. The antennæ are much longer than those of the last, and doubly pectinated in both sexes, those of the males being blackish, of the females brown. The palpi of the latter are longer, reaching much beyond the head, and are greyish brown, while those of the males are black. Both pairs of the wings are broad; the forewings are considerably rounded in front, the border is also much rounded, and merges imperceptibly into the very short inner margin. The colour is blackish grey, darkest in the middle, and varied with numerous, narrow undulating, or intricate, often parallel, lighter and darker linear markings. The irregular silver stripe in the disk of the wings is very broad and promiscuous, as is also the irregular, broad, oblique bar near the border. Between the two is also a more or less complete transverse row of small silvery spots, and between the broad bar and the border a narrow, more or less distinct, undulating band with dark edges. The hindwings are of a uniform pale brownish grey tint. The males are smaller, the forewings pale ashy grey with the silver stripes and band, and very dark intricate markings, which cannot be described in detail, and vary almost with every specimen.

This species is abundant wherever the white gum Eucalypts (E. leucoxylon) occurs, which therefore appears to be the proper food-plant. The habits of the larvæ and chrysalids are similar to those of the last, the moths emerging from April to August.

The two last species are so numerous in the Park Lands around Adelaide and suburbs that in a walk at the proper season one meets with hundreds of pupa cases sticking out of the ground; on one occasion the writer having counted several scores under a single tree. Considering this, it is no wonder that the trees look unhealthy; the wonder really is that the trees at all survive the attacks of their numerous enemies, proving the astonishing vitality of the trees.

## NOCTUÆ, OR NOCTUITES.

The Noctuæ, as a division of the moths, are so named on account of the pre-eminently nocturnal habits of by far the greatest number of its members, and comprises about fifty families, of which some 27 to 30 are represented in Australia. This division has been little studied locally, on account of the difficulty of separating the usually sombre-coloured species, besides the want of the necessary very extensive literature, &c., that few species are found named in the comparatively meagre collections, or prove identifiable with any degree of certainty without access to type collections for comparison. We shall, therefore, content ourselves with giving the general characters of the division of the principal—that is, largest families—and describe some species either from identified specimens, or using extracts from the descriptions in Walker's "Catalogue of the British Museum Collections."

The Noctuæ ("*Eulen,*" Germ.) are usually of moderate size, and have a stout hairy body, which usually tapers to a point, extends beyond the hindwings, and bears a tuft sometimes. The proboscis is rather long, and winds up spirally when at rest. The antennæ are also moderately long, either bristle-like or slightly toothed in both sexes, or pectinated (in the male only). The wings are moderately broad, the first pair triangular; the hindwings broader, shorter, and more slender, and mostly more uniform in colour, which is usually brown, grey, or white, varied occasionally with a dark band near the border and a dark spot in the middle. They sometimes also show rainbow tints—*i.e.*, are iridescent—while in some families or genera they are of similar tints as the forewings.

The larvæ or caterpillars have usually sixteen legs, but in a few species, it appears, only fourteen or twelve respectively; are slightly velvet-hairy, and either feed by day or by night, seemingly irrespective of the habits of the perfect insect; but most of them shun the light more or less, as indicated by their sombre colouring.

The pupæ or chrysalides are mostly dark brown, very inert, and either protected by a slightly silky web, a thick cocoon, or quite destitute of any covering. They are concealed under loose bark, logs, stones, &c., or buried in loose ground. The moths sip the nectar of flowers only, and assist in fertilising many plants.

Some of the caterpillars are very destructive to vegetation, and highly troublesome in forest, field, and garden.

All Noctuites can be naturally separated into two divisions, of which the one has the palpi (feelers, or rather *tasters*, attached to the mouth parts) short or moderate, and their third joint short; and the other long, bent upwards, and the third joint long and slender, and sometimes enlarged at the end.

The first division is again divided into three subdivisions, of which the first has the palpi short and strong, and short legs; the second stout, well-developed palpi and thick legs; and the third a slender body, long and slender legs, and broad wings.

Of the three families of the first subdivision, the first, or CYMATOPHORIDÆ, is distinguished by the first two veins of the hindwings being separated at the base, and represented by the following species, reported by Walker, from Sydney.

*Corula geometroides*, Walker, is about one-third of an inch long, the wings extending a little over one inch. The colour is grey; the thorax marked by a black stripe, edged whitish. The forewings have three transverse black lines, a black mark in the disk, and another on the front margin. The hindwings are whitish, with grey borders. The body is slender, the antennæ slightly pectinated, and the abdomen not extending beyond the hindwings.

The second subdivision embraces ten families, of which one, the HELIOTHIDÆ, fly by day. Several of these have representatives in Australia and in our province.

The LEUCANIDÆ have the body usually stout, but occasionally slender, a short proboscis, short palpi, and simple antennæ. The forewings are *pale, without the usual transverse marks*, and are rather narrow; the hindwings are mostly white. The larvæ are smooth, of equal width, have sixteen legs, and feed on low plants. They undergo the change into the chrysalis in some cavity of the ground.

The genus LEUCANIA is characterised by a stout body, the second joint of the palpi four times longer than the third, and the pale forewings not spreading, and neither bent nor hooked. It is found almost all over the earth, and even some of the species are very widely distributed; thus *Leucania extrania*, L., occurs in North and South America, India, Australia, and New Zealand. It is rather large, and has acute pale forewings, varying much in minute markings.

*Leucania uda*, Guénée, has its pale fawn-coloured forewings evenly dotted with minute specks, white veins, and a broad border. The hindwings are dark.

*L. cramboides*, Guén., has dark reddish forewings, with a white discal line, and the hindwings paler, with white hairs along the border. The abdomen is pale reddish. The precise locality of the above appears to be uncertain, as also of such species of which it is not specially mentioned.

*L. truncata*, Walker, has the pale fawn-coloured forewings rather short and narrow, the tips obtuse, the borders moderately oblique, and a transverse line of very minute indistinct black dots. The hindwings are ashy grey. The body is about one-third of an inch in length, and the wings expand nearly one inch. It occurs about Adelaide (Walker).

The genus NONAGRIA resembles the last genus, but has the face covered by tufts of hair.

*Nonagria abdominalis*, Walker, has a robust body, short proboscis, ascending palpi, smooth thorax, and the abdomen extending beyond the hindwings. The antennæ of the male are toothed, those of the female simple. The forewings are pale shell-tinted, and unmarked, the hindwings pearly white. The abdomen is rather long, tawny, but whitish at the tip. The legs are very hairy. The length of the body is about half an inch, while the wings expand about double that (Walker).

The GLOTTULIDÆ are characterised by the palpi being almost obsolete. Their body is either stout or slender, and the colour of the rather broad forewings either black or otherwise brightly tinted. Walker only describes one species from Australia, though no doubt many exist.

*Glottula atronitens*, Walker, measures under half an inch in length of body, and one inch in span of wings. It is stout; the hind tibiæ have short spurs. Its colour is black, the abdomen ashy grey, while a transverse row of deep black dots towards the border marks the forewings. The hindwings are dirty white, with a grey border.

The Apamidæ, a large family, are distinguished by small or moderate size, ascending palpi, legs mostly without spurs, dark-coloured wings, and more deflected when at rest, the tips of the forewings being dark.

*Nephelodes rubiolans*, Guén., has a stout body; obliquely upwards directed, hairy palpi, and minutely toothed antennæ. The forewings are straight in front, with an angular tip; reddish, with distinct marks, the central spot being almost round. The hindwings are blackish, with pinkish fringe.

*Calogramma festiva*, Don., has the wings elongated, the forewings being wood coloured and striated. It has a shell-like lustre, and the thorax is varied with red. The whitish forewings are marked with reddish black, while the white hindwings show a bluish, opaline tint. It is recorded from New South Wales.

*Mamestra nigerrima*, Guén., is a moderately-sized moth, not rare in South Australia. The body is about five-eighths of an inch long, and the wings extend above an inch and a half. It is black, the end of the thorax and the base of the abdomen being whitish. The feet are ringed with white. The black forewings show some indistinct zigzag lines and streaks, and have in the middle a whitish or yellowish, more or less distinct, oval spot. The basal part of the hindwings is whitish, with a small dark spot; the remainder is black. This species flies about July, and is usually found by day resting on some blackened or dark timber near the ground. Four other species of this genus inhabiting Australia are described by Walker, and there are several others not yet indentified known to exist in South Australia. The genus is easily determined by the dark wings and the second joint of the palpi being four times longer than the third.

*Dasygaster Hollandiæ*, Guén., is mouse-coloured, the abdomen grey. The antennæ of the male are stout, the teeth ending in bristles. The abdomen is very hairy beneath and crested above. The kidney-shaped and round ring marks, as well as the incomplete transverse zigzag lines, are white, with dark borders. The hindwings are brownish grey with white fringes.

*D. epundoides*, Guén., has dirty blackish forewings, sprinkled with grey, with a yellowish white mark near the middle, and some black, pale bordered streaks. The hindwings are brownish grey, with whitish fringe and a whitish discal spot edged broadly with brown.

*Apamea florescens*, Walker, is under half an inch long, the wings expanding about one inch. The genus is rich in species, and characterised by the second joint of the palpi being less than four times the third in length, and the dark-coloured forewings having the border toothed. It extends to Europe, where it is best represented, and to North America. The species is fawn-coloured (yellowish-brown, like a deer). The thorax has whitish bands, and the abdomen is whitish. The forewings are greyish, with whitish, fawn and brown lines and marks. The usual round spot is fawn-coloured, with brown border. The hindwings are whitish. The above species is recorded from New South Wales, but some undetermined species appear to exist in South Australia.

*Perigea tonsa*, Guéneé, is yellowish grey, its abdomen is flattened above with the second segment a little crested, and the palpi turned upwards, the second joint being more than half as long as the third (generic distinction). The forewings are sprinkled with blackish dots, the streaks are pale flesh coloured, and the usual round and kidney-shaped spots have small, nearly equally sized pupils. The hindwings are whitish, with ashy grey borders.

The Caradrinidæ are distinguished by dark one-coloured forewings, marked by distinct lines; their hind shanks bear no spurs, and the wings at rest are deflected. The family occurs in all the other continents, but no representative is recorded for Australia by Walker.

The Noctuidæ resemble the preceding, but have spurs on the hind tibiæ, and wear the wings flat, not deflected, while at rest. They are well represented all over the earth, some of the genera even being almost cosmopolitan, like *Agrotis* and *Graphiphora*. The former has the forehead prominently tufted; short, horizontal palpi, and the antennæ of both sexes comblike or hairy. The following—and no doubt other besides—occur in South Australia.

*Agrotis munda*, Walk., is hoary in general tint. The thorax has a brown band, the forewings are straight in front, the tips mostly rounded, and the brown border more or less oblique. A pearly mark near the base joins on to a lancet-shaped black bordered streak. The two spots present in the disk of most of the Noctuæ moths, and called the "orbicular" (round) and "reniform" (kidney shaped), are present, but the one is pear shaped and the other almost four sided. Beyond them a row of exterior brown streaks with white tips and a row of small black half-moon spots (lunules) occur. The species measures about half an inch in length and one inch and a quarter in span. It extends to New South Wales, Tasmania, and New Zealand.

*A. suffusa* (W.V.?), Heubn, a European species, is recorded from South Australia and Queensland, but has been most likeiy introduced by means of live garden plants in the form of eggs or very young caterpillars, and is not conspicuous apparently in number. There are other species besides these.

The genus Graphiphora differs from the last by the front of the forehead not being conspicuously tufted. The hindwings being never yellow separate it from Epilecta and Tryphæna, the front margin *not* pale from Ochropleura, and the palpi much exserted from Segestia, according to Walker's diagnosis.

*Graphiphora reclusa*, Walker, is over half an inch long and about one inch and a third in span. Its colour is fawn above and mostly white beneath. The head is white in front and the thorax partly covered with white hairs, the abdomen being pale grey. The forewings are pale, with some black marks along the frontal margin and a blackish, somewhat indistinct band near the border. Behind the round spot in the disc is a blackish one, with a black centre, and enclosed in a fawn ringlet. The kidney-shaped spot is blackish and almost oval, and along the border is a row of black lunules. The hindwings are whitish, with a brown border and a central mark also noticeable beneath. No precise locality is recorded (*Walker*).

*Grapiphora* sp. This moth is dark brown, the abdomen paler, and measures about three-quarters of an inch in length and one and three-quarters in span. The discal spots are grey, joined by a black four-sided mark. The hindwings are paler, with blackish border and white fringes. Its caterpillars are dull greenish brown, smooth, and feed on herbs by night, attacking frequently those in gardens from August or September till November. The pupa is short, thick, blunt in front, conical behind, and of a glossy-brown colour. It is found (without any cocoon) concealed in loose soil an inch or two below the surface. There seem to be several broods during the spring and summer, the pupæ of the last remaining dormant from February till about September. The moths fly at night chiefly from October to November, and hide by day under bark or low vegetation in situations agreeing with their own colour. The species is found over all the southern portion of this province.

*Ochropleura tortisigna*, Walk., is under half an inch long and one in span, reddish, the hind part of the thorax brown, and the forewings rusty, with a blackish tinge. The veins are blackish, while the disc or middle portion is marked by two large pear-shaped dark-brown marks, and a long blackish-brown streak containing the white, very small round spot and linear kidney-shaped one. The frontal margin is whitish, and the hindwings pale, with pearly lustre and broad brown borders. Walker cites Tasmania as its habitat, but it probably also inhabits this province.

The ORTHOSIDÆ are moderate or rather small in size, but stout in body. Their proboscis, spirally wound together at rest, as with all the Noctuæ, is moderately long, indicating that they sip the nectar of flowers by night, or sometimes short; the palpi are generally also short and almost straight. The abdomen is usually smooth, and so are mostly the moderately long legs. The forewings are variously, but dull, coloured, and have a darker transverse line near the border, which in most cases is straight.

Though some species are common, yet none appear to multiply in such a manner as to become a pest, even locally, as is the case with some species of the Agrotidæ. Most of the caterpillars feed on low herbs, or more rarely on shrubs.

Walker describes 24 genera, among which there are three recorded for Australia, viz., Ceramica, Orthosia, and Cerastis. They agree with most other genera in having the hindshanks slightly tufted, the border of the forewings entire, and the thorax not downy, but differ from most in having long spurs on the hindshanks. The first is distinguished by having the antennæ of both sexes beset with fine hairs, and the border of the forewing convex; the second by straight borders, the almost bead-like antennæ finely hairy, and the palpi longer than the head; and the third by shorter palpi and short forewings.

*Ceramica marynx*, Guén., is blackish red, the thorax almost bearded, and the forewings marked by pale blotches, indistinct, pale, transverse lines, and the kidney-shaped spot varied by whitish scales. The hindwings are dark grey, the double lines along the border and the fringe being of a paler tint than the rest; below the wings are whitish.

*Orthosia pulvis*, Guén., is blackish grey; the forewings are without marks, speckled all over, and have a grey border; the hindwings are of about the same tint, the base and the fringe being paler, the latter intermixed with black. Below the discal spots appear like short lines, though indistinctly.

*Cerastis punctuosa*, Walk., is grey, the forewings are finely speckled with brown, are marked by some blackish dots along the front, and have a transverse row of brown dots near the border. The two usual discal spots are present as pale-grey ringlets of rather irregular form. The fringe as well as the broad border of the under side is purplish. Its length is about half an inch, and the span one inch and one-sixth.

The HADENIDÆ resemble the last, but have their stout palpi turned upwards, the abdomen ornamented with crest-like long hairs, and the forewings with a broken line near the end. This family consists of some 24 genera, resembling each other considerably, and are scattered over a great portion of the earth, of which some half a dozen occur in Australia, from which we select Dianthæcia and Hadena as being recorded for this province.

The species of the first genus are characterised by a stout body, a rather short proboscis, and short, straight, velvety palpi, scarcely projecting beyond the head, the third joint of which is very minute. The legs are stout, and the shanks or tibiæ of the last pair have four long spurs. The wings are moderately broad, the first pair being straight along the front, with rounded tips and moderately oblique border. The male has the antennæ beset with very minute hairs. The abdomen, especially of the female, is longer than usual and tapering to the tip, which distinguishes this genus from all the others.

*Dianthœcia* (?) *interferens*, Walker, measures under half an inch in length and full one inch in span. Its prominent colour is rusty red, the palpi are partly black, and the thorax has black bands. The forewings show some double blackish transverse lines, which are wavy in form, and usually rather indistinct in their outline; near the border is a row of small black half-moon spots; the usual discal spots are almost absent, the round one being denoted by a pale dot and the other by a black mark. The hindwings are grey, tinged slightly with rusty. That the species occurs about Adelaide is all that can be said of it.

The genus Hadena resembles the former considerably, but has a long proboscis and a rough hairy thorax; the stout palpi are longer and slant upwards, while the tips of the forewings are more pointed, and the border toothed. The generic distinction, besides the ascending palpi, are rather long feet. It is numerously represented in all continents.

*Hadena bistrigula*, Walk., is about half an inch long, and spans nearly one inch and a quarter. It is rusty brown above and grey beneath; part of the palpi, some bands on the thorax, and the whole abdomen are also grey, while the indistinct transverse wavy lines of the forewings are pale rusty and blackish. There is also a row of pearly dots along the border besides some other marks; the round spot is distinguished by a white dot and the kidney spot by two white streaks. The hindwings are grey, with a brassy tinge and whitish fringe. The species is reported from Adelaide and Tasmania, while a number of others hail from the same and other parts of Australia.

The XYLINIDÆ also form a large family of some twenty genera, scattered as far as the last. The chief distinctions are an elongated body, the prothorax mostly covered with erect hairs, the absence of spurs to the legs, and the elongated forewings streaked lengthwise with more or less extended lines.

The genus Auchmis is distinguished by simple antennæ (smooth and bristle-like), a moderately long proboscis and straight palpi.

*Auchmis composita*, Guén., measures respectively half an inch and one and one-sixth in length and span, and is hoary (or as if frosted over). The thorax shows some brown stripes and bands, and the forewings have a brown discal stripe and border, while a line near the base, the exterior veins, and a row of dots near the border are black. There is also a white figure in the brownish middle part of the wings, and a brown transverse zigzag line. The hindwings are brownish grey with white fringe. The species is recorded from Adelaide, Tasmania, and New Zealand.

The genus Xylina is distinguished by a stout body, rounded tips of the forewings, and the third joint of the palpi not being less than one-third of the length of the second.

*Xylina serrata*, Walk., is over half an inch long, and spans an inch and a half. It is blackish grey, the head rusty coloured and tufted. The antennæ of the male are comb-like, and the rusty banded thorax bears a high crest. The rusty border of the forewings is deeply toothed, the discal spots scarcely distinguishable, while a row of elongated black dots marks the exterior margin. The hindwings are also toothed, and greyish with brownish border. Its habitat is Tasmania.

The HELIOTHIDÆ are distinguished from the other Noctuæ by their habits being wholly diurnal. The caterpillars live on grass and low herbs, usually singly, have the usual sixteen legs, while their surface is covered with small low raised round spots, each of which bearing a very fine short hair. When mature they bury themselves in the ground, and change into the chrysalis without spinning a web. The moths show usually little or nothing of the peculiar Noctua pattern, the forewings being pale yellowish or reddish, while the hindwings are either white or otherwise pale tinted, with a black or blackish border, or are almost wholly black, with pale marks. Besides these characters, the chief distinctions are simple antennæ, and the legs either spined or armed with claws.

The genus Heliothis, the largest of the family, is distributed over all continents, even New Zealand and Polynesia, and varies very much in colouring. It is distinguished by a stout body, the thorax without a crest, porrect palpi (stretched out in a straight direction forward), and pale forewings. The larvæ are usually dull coloured, with several whitish stripes.

*Heliothis conferta*, Walk., is fawn coloured, and inhabits New Zealand; *H. assueta*, Guén., is brownish-red, and occurs at Tahiti; and *H. separata*, Walk., of a pearly tint, is found at the Navigator's Islands. Our own species, to which at present no name can be assigned *(H. punctifera*, Walk.?), is more or less pale fawn, slightly clouded with darker shades, and more or less speckled with dark scales. The hindwings are paler than the forewings, with an ill defined darker border. They fly from September till January (or later) in the hottest sunshine, usually resting among the low herbage, or sipping the nectar of Cryptostemma (the Cape Dandelion) or other composites, Wahlenbergia (Australian Blue-bell), Bursaria, &c., even frequenting city gardens. They are very shy, and when disturbed dart away with great speed, and to considerable distances, so that they are difficult to catch. The eyes, in certain positions, glow like fire.

*Panomeria tortriciformis*, Guén., is generically distinguished by small size, angular tips of the forewings, and extremely short palpi. The brown forewings have two bands, and are clouded with fawn colour; around the margins they are streaked pale, while some scales and the ciliæ shine in steel blue. Near the tip is a yellowish white blotch, and in the disc a blackish spot bordered blue. The hindwings are yellow, with a broad border of black. Habitat Australia.

The third subdivision of the trifid moths comprises those with long slender legs and broad wings, and is separated into two sections according whether the body is more or less thick or decidedly slender. Of the former those with a short or very short proboscis form the family of the Hemeroidæ, and with a moderately long one the Acontidæ. Of the latter those which have conspicuous palpi, a highly crested abdomen, and the forewings with an areole or transparent spot, constitute the Erastridæ; those with smooth abdomen and wings, without areolet, the Anthophilidæ, and those with extremely small palpi the Phalænoidæ. The second and fourth have representatives in Australia, the fifth consists of a single genus of a few species living in Europe and North America.

*Xanthodes migrator*, Walk. (Acontidæ), measures two-thirds of an inch in length and one inch and a half in span. It is yellow, the abdomen pale fawn, and the forewings have three transverse, very angular, reddish-brown lines and a large spot near the border of the same tint, besides a minute black spot near the tip and some black speckles elsewhere. The hindshanks are tufted, and the third joint of the palpi is half the length of the second, while the wings are only thinly covered with scales, in which this genus agrees with Acontia, but differs from the next. Queensland is its recorded habitat.

*Leocyma Dianæ*, Guén., has the wings densely scaly and thick, and the antennæ slender, their lower half being velvety hairy. It is snowy white and shining, except the tips of the palpi, the antennæ, and fore tibiæ, which are rusty tinted, while the feet are dotted black. Habitat Australia, but the part uncertain.

*Acontia pulchra*, Walk., is slightly larger than the first of the above species, has the hind tibiæ (shanks) without tufts, but very long spurs, tips of forewings rounded, antennæ simple in both sexes, and the short abdomen not compressed. It is white, the front of the head and the tips of the palpi reddish, while the forewings have four reddish marks along the front margin larger in succession from the base; also an oblique brown streak sprinkled with blue, a pearly line and a row of brown half-moon spots near the border. It hails from the north-west coast of Australia, while the other species, *A. undulosa*, Walker, lives in Tasmania, and very probably some unnamed species in Southern Australia. The above species is also whitish, but the palpi and forelegs are black, the thorax with a black band. The abdomen and hinder legs are yellowish, the forewings marked with three greyish zigzag lines and other marks. The hindwings are yellow, with brownish tips. It measures only one-third of an inch in length and one inch in span.

*Micra derogata*, Walk. (Anthrophilidæ) is very small, being under one quarter of an inch in length and a little over half in span. It has a slender body, very short proboscis, and moderately broad deeply-fringed wings. The colour is yellowish white, the forewings with a broad oblique rosy band bordered with reddish yellow, and another reddish one near the border, and marked black on the inner side behind. The hindwings are whitish, with brownish borders. The exact habitat unrecorded.

### NOTE ON PIELUS LABYRYNTHICUS.

At the present time, *i.e.*, since the beginning of April, large moths destructive to Eucalypts are emerging in considerable numbers from the ground, where the caterpillars fed upon the roots, the chrysalis case being left sticking half-way out of the hole. By far the most of them belong to the species named *Pielus labyrinthicus*, and a very few to another kind, which were described in the *Garden and Field*, p. 100. A nearly mature chrysalis was presented by Mr. W. Fiveash at the end of last month, which hatched in a few days, and produced a small female, which next morning was found to have laid a number of eggs. When taken out of the box it at once proceeded to lay some more, and in less than two minutes dropped some two grains in weight. These eggs are very small, and very smooth. White at first, they soon become yellow, and finally, through shades of grey, assume a deep glossy black colour. They are also remarkably mobile, running wildly about with the slightest slanting of the surface of the vessel, something like globules of mercury, and are so elastic that if dropped from so slight a height as one quarter of an inch they rebound much more actively than an indiarubber ball would. The eggs were duly collected and weighed, and the number calculated, with rather astonishing results. The weight of the whole was 65 grains; a single grain carefully weighed, and the eggs counted, gave 405 per grain, the whole therefore amounting to 26,325! Fourteen eggs in a line measured exactly one quarter of an inch; each has therefore a diameter of one fifty-sixth of an inch, and the whole mass of the 65 grains made up a column in a glass tube seven-eighths of an inch high by three-eighths in diameter. With such fecundity it is no wonder that these creatures are so numerous. They must have many enemies, else with the absence of birds about town they would soon render all vegetation impossible.

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The second great divison of the Noctua-moths, the NOCTUELITES QUADRIFIDÆ of Guénée, differ from the TRIFIDÆ in being mostly of rather large size, and that the body is often slender, though sometimes stout. Their wings are broad and especially the hinder pair larger in proportion, the main distinction being in the four inferior veins, which are more equally developed (hence the divisional name, the first division having the first one always much weaker than the others). The palpi are also much better developed, the third joint mostly very long in proportion, and sometimes spathulate, that is, dilated towards the tip.

They are again divided into eight or ten tribes, according whether the Pyralites and Geometræ are included or not. The three first tribes wear their wings in a decumbent position in repose, and have the first inferior vein of variable structure; the other five wear the wings flat or extended, and have the first vein equally thick and more distant from the other three than these are from each other.

The SERICEÆ have silky wings, either uniformly coloured or ornamented with eye spots, and embrace two small families of two genera each, of which three live in South America, and one, *Homodes*, in India.

The VARIEGATÆ are usually of very moderate, or small size, have the border of the wings either angular or toothed, or the wings marked by metallic spots or a metallic tinge, while the hindwings are usually particoloured; the first inferior vein being very much weaker than the others. They embrace eight families, several of which are represented in Australia.

The INTRUSÆ are from moderate to large in size, have the abdomen depressed, and the wings clouded (the hinder pair of two colours), while the first vein is weaker and more remote. They contain three families, of which one is represented in Australia.

The EXTENSÆ are of moderate size, their wings of one colour, the marking much on the same plan and not very distinct below. They form three families (one very large), of which two occur in Australia.

The LIMBATÆ are mostly of large, or moderately large size, their wings being always of two colours. Their five families are, with the exception of one, represented in Australia.

The PATULÆ are also of large size, and have broad, one-coloured wings, marked with mostly parallel lines; the third joint of the palpi is long and linear. Three out of their four families occur in Australia, and some in this province.

The SERPENTINÆ have a broad abdomen, and the third joint of the palpi is of moderate length, but never spathulate. Representatives of three out of the four families are found in Australia.

The DELTOIDÆ have contracted, one-coloured wings, marked distinctly below, and long legs, the hinder pair with four long spurs, and the middle pair with two (in the sub-tribe Pseudo-Deltoidæ). The palpi are very long, even reverted, and placed along the thorax; the third joint is always distinct, and often forms an elbow with the second. They form two sub-tribes, of which the first (mentioned above) consists of three families, and the second (Deltoidites) of seven. Both have representatives in Australia.

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*Cosmodes elegans*, Donovan, belongs to the family of the Eriopidæ (Variegatæ), which is distinguished by the small ray-like bristles at the tip of the crested abdomen, simple antennæ in both sexes, and the border of the hindwings being either jagged, toothed, or polygonal. The genus is restricted to Australia, and is distinguished by the third joint of the palpi being very minute, and the abdomen extending but little beyond the hindwings. The above is the only species recorded, and measures under half an inch in length, the span of the wings being about one inch and an eighth. Head, thorax, and forewings are brown in several shades; the latter have a pale green stripe extending from the base to the middle, where it curves upwards and back, forming an incomplete oval; beyond it are two trigonal pale green spots, separated from each other and the upper one from the curved stripe by a short, oblique, pale fawn streak; along the border near the tip is a short triple band, black, white, and fawn. The green marks have a narrow, incomplete, metallic silvery border, and the remainder of the surface a coppery lustre. The wings are straight in front, those of the male rounded, of the female pointed; the border of the former is also more angular than that of the latter; the hindwings and the abdomen are pale greyish white, the former have a very narrow dark border. Underneath the colour is mostly a brownish grey.

This elegant little moth is not at all rare in the South-East, where it is usually found resting on ferns or other low plants in the daytime; it is also found in the Mount Lofty Ranges, about Lyndoch, &c.; one was captured alive in the Museum hall. They fly from about December till April, but the habits of the caterpillar, &c., have not been observed here. The species extends to Queensland, New South Wales, and New Zealand.

The Eurhipidæ have the basal half of the antennæ always distinctly ciliated, and the first of the inferior veins of the hindwings scarcely distinct. They are represented in Australia by the following species:—*Phlegetonia carbo*, Guénée, the dull black forewings of which have deep black, double, transverse lines, and a few scattered white scales, while the hindwings are white and opaline, some of the veins near the border being blackish. The genus extends to South Africa.

The Placodidæ have lustrous forewings, somewhat curved in front, and trifid hindwings. They only comprise two genera, not represented in Australia.

The Plusidæ have slender ascending palpi, and mostly the forewings more or less ornamented with golden or silvery marks. In common with the two next families they have a thick conical abdomen, somewhat thinner at the base, and the inner margin of the forewings fringed tooth-like by fine hairs. Of the ten genera the genus *Plusia* is by far the largest, containing over a hundred species scattered almost over the whole earth. It is distinguished by the smooth interior margin, and the golden or silvery spots on the forewings of most of the species, besides the crested abdomen. There are some four or five species recorded for South Australia, among which is a European one, viz., *Plusia gamma*, L., but perhaps under a mistake.

*Plusia argentifera*, Guénée, is about five-eighths of an inch long by one inch and a half or more in span. The general colour is grey, the forewings exhibiting a varying coppery lustre. Near the base of the latter is a very short and a longer, narrow, bright silvery band, a similarly short bi-angular line (resembling somewhat a pothook) near the kidney-shaped spot, and in the disk of the wing two very brilliant silvery spots, the first formed of a recurved line enclosing a narrow darker space, the other trigonal, the acute angle almost touching the first; near the tip is a short, pale, slightly oblique band, and along the border some paler and darker, more or less distinct lines. The hindwings are brownish-grey, with a broad dark border and dark veins. The fringe is rather broad, and marked regularly with darker rays. The antennæ are very slender, and rather long, and the crests of the thorax and abdomen very promiscuous.

The species resembles the European *P. interrogationis* considerably, and is very common in most parts of the province. The caterpillars are dull brown or greenish, smooth, thick, and roll themselves together when alarmed. They are polyphagus, and attack most of the cultivated plants in gardens and fields, such as wheat, potatoes, lettuce, cabbage, turnips, even pelargoniums during winter and spring. When not sheltered by the broad foliage, they bury themselves an inch or so in the soft soil during day, otherwise they cling to the underside of the leaves, but drop to the ground when disturbed, remaining motionless in a ringlike position, in which they are detected with difficulty. When mature they spin a thin, white, transparent, silky cocoon, fixed in the fold of a leaf, &c., or just below the surface of the soil. The moths often emerge from the chrysalis in less than a fortnight, fly at night, when they are frequently caught near the lights, but sit still during day, though easily roused. They are met with from September till March, and when numerous—which is not the case every year—do sometimes considerable damage locally as caterpillars. The moths themselves feed on the nectar of various flowers. The species extends to the eastern colonies and Tasmania.

*P. verticillata*, Guén., is hoary, the thorax striped brown, and the forewings purplish, varied with gold and some silvery lines and spots. Besides Australia, it is recorded from India, China, Java, and Natal (Walker). Length half an inch, span of wings about one inch and one-eighth.

*P. secundaria*, Walk., is pale greyish brown, the thorax with a pale slender band. The forewings are grey, mostly gilded, the silvery marks resembling the preceding; the submarginal brown line is broken, and sends a straight streak to the middle of the wing. It is the smallest of the Australian species, being under half an inch long and an inch in span. Walker records it for South Australia, New South Wales, and West Australia.

*P. subsidens*, Walk., is grey, the thorax rusty red, and the forewings somewhat similarly marked as the preceding. It is probably only a variety of *P. argentifera*. Its habitat is New South Wales (Walker).

*Abrostola transfixa*, Walker, is an example of those Plusidæ which are not conspicuous for metallic markings, and inhabits Queensland. It is over half an inch long, and nearly an inch and a half in span, grey, the thorax brownish, with two grey bands and a black one; the forewings are brassy tinted, with the usual narrow black lines and a pale yellowish grey streak, narrowly bordered with silver. The hindwings are brassy grey, with paler fringe.

The Calpidæ have the palpæ thickened, and the forewings always metallic.

The Hemiceridæ have the long antennæ pectinated in the middle, and silky wings without metallic marks.

The Hyblædæ have a stout body, the palpi extended beak-like, a conical banded abdomen, and thick, smooth-edged wings. Neither of these appears to occur in South Australia.

The Gonopteridæ have the abdomen depressed, the border of the forewings angular, and the round spot represented by a dot.

*Cosmophila indica*, Guén., has short palpi (not beaklike), a rather slender body and legs, and the abdomen not enlongated. The general colour is ochreous, the abdomen much paler. The forewings have four transverse angled lines, a whitish stripe in the middle, and a purplish band near the border. The hindwings are yellow. This species is recorded by Walker from Western Africa, Ceylon, India, Queensland, and Tasmania, and no doubt, is also to be found in South Australia, though not yet identified.

*C. xanthindyma*, Boisd., is pale yellow, speckled darker, and has almost as wide a range.

The Amphipyridæ (Intrusæ) have a stout body, and the head rarely tufted. Three of the five genera have the depressed abdomen crested, the others not, and all thick lustrous wings.

*Amphipyra sanguinipuncta*, Guén., the Australian representative of the largest genus, is brown, and has black white-tipped palpi. The thorax is black and whitish, the straight, slightly oblique, and rounded forewings are deep brownish grey with whitish and blackish transverse lines and spots; those near the border, as well as the three noctua spots, are dotted red. The precise locality is not recorded by Walker.

The Taxocampydæ are distinguished by a much enlarged abdomen and ample wings (nine genera), and the Stilbidæ by a slender body (one genus of two European species), appear to be absent from Australia so far; but not so the following tribe (Extensæ) two of its three families being well re-represented by several genera aud numerous species.

The Polydesmidæ are usually (as well as the other two families) of small size, and distinguished by almost vertically ascending palpi, clouded and festooned wings, a conical, smooth, or crested abdomen (male), and long stout legs. There are four genera, two of which are Australian.

*Pantydia recondita*, Walker, is grey, and over half an inch long, the wings extending nearly an inch and a half. The body is stout, the *proboscis very short*, and the rather short abdomen crested. The obliquely ascending palpi are grey outside, the thorax blackish in front, and as well as the forewings, speckled black. The latter are marked by three indistinct brown bands, a pale line and a row of dark points along the border. The pale hindwings have a broad brown border. Beneath both pairs have a brown border. The species is recorded from Adelaide and other parts of Australia, but appears not to be promiscuous.

*P. sparsa*, Guén., has greenish clouded forewings, and the second joint of the palpi brown, with white lines.

*P. Diemeni*, Guén., has the forewings marked with blackish and black lines and spots; the second joint of the palpi is also blackish. It inhabits Tasmania.

*Diatenes gerula*, Guénée, has a moderately long proboscis, and the abdomen, which is crested, extends very little beyond the hindwings. The moderately broad wings are slightly toothed, grey, and opaline. The forewings have five large wedge-shaped black spots along the straight front margin, and five lines, of which the three alternate ones emit transverse branches. The hindwings have two dark narrow half-moon spots in the middle.

*D. chalybeus*, Guén., is violet brown, the abdomen bluish, and the forewings cloudy steel blue, with three transverse black lines, bordered fawn, and other markings.

*D. subsignata*, Walk., is greyish brown, the abdomen grey, and the wings speckled with darker brown dots, forming three indistinct bands. It is over half an inch long, and spans nearly one inch and a half.

For neither of the above is the part of Australia recorded whence they were obtained.

*D. aglossoides*, Guén., with blackish brown head, occurs in Tasmania.

The HOMOPTERIDÆ have all the wings similarly coloured, and the abdomen of both sexes broad and flat, with very distinct crests. They comprise some eight genera, mostly small, and none Australian as yet.

The HYPOGRAMMIDÆ have the hindwings more or less differently coloured and marked than the forewings, and have a woolly or crested abdomen, which is never flat. They comprise some thirty-two genera, mostly small or monotypic, of which one—*Praxis*, known from Tasmania and Queensland—contains six species, the remaining four Australian genera being monotypic apparently.

*Praxis corvus*, Walker, is coal black, paler beneath; the proboscis tawny, and the antennæ rusty below, while the tarsi of the forelegs show pale bands. The lustrous wings are speckled with deep black, and have two similarly tinted undulating lines in common, the forewings showing a third one. The length and span is two-thirds of an inch and one inch and a half respectively. It occurs in Tasmania.

*P. porphyretica*, Guénée, is rusty coloured, the wings pale greenish blue, with many oblique lines of deep black points. It inhabits Tasmania.

*P. Edwardsi*, Guénée, is deep blackish, the forewings with numerous velvety black undulating lines, partly with a pale border. It is found in Tasmania and on the continent.

*P. inordinata*, Walker, is two-thirds of an inch long and spans one inch and a half. The pale greyish brown wings have a coppery tinge, some oblique brown lines and black marginal dots, the fringing hairs being white at the base. The forewings have a very oblique border, some whitish marks along the front, and a short oblique black middle line; the hindwings, a broad, blackish-blue band beneath. Size, two-thirds of an inch long by one inch and a half span. Habitat, Tasmania.

*P. illapsa*, Walk., from the same locality, is grey and rusty, while the blackish, rusty speckled *P. dirigens* is found in Queensland. No species of the genus has yet been recognised in South Australia.

*Ericeia sobria*, Walker, has the head crested, stout palpi, and the abdomen not long. It is grey, thorax and wings speckled black, the latter also with some faint lines, a brown band, &c., and is over half an inch long by one inch and three quarters in span. Habitat, Queensland.

*Corrha difficilis*, Walker, has clubbed palpi, and is coal black. The lustrous forewings have still deeper black transverse lines and dots; the hindwings are brown near the base. It is rather smaller than the last, and inhabits Tasmania.

*Crio acronyctoides*, Walker, is smaller than the last, hoary, the forewings marked by two very irregular, deep black zigzag lines, besides other markings. Queensland.

*Prometopus inassueta*, Guénée, is white, varied with pale yellow and black, and the third joint of its palpi is spoon-shaped.

Four out of the five families of the fifth tribe —LIMBATÆ—are represented in Australia, but only sparingly in genera and species. The three first families are distinguished by mostly moderate size and short or moderately long antennæ, the remainder by mostly large and long antennæ.

The CATEPHIDÆ have the joints of the palpi distinct, the middle or the base of the hindwings white, translucent, or but little covered with scales, and the thorax and abdomen distinctly crested. Fifteen genera, two Australian.

*Anophia acronyctoides*, Guénée, is greyish brown, the thorax striped black and white. The forewings have black lines and white marks; the hindwings are coppery brown. The species is recorded from India, Ceylon, and Tasmania.

*Lophoptera squammigera*, Guénée, has straight palpi, the third joint extremely short, and narrow wings. The first pair is brown with black transverse lines, streaks, and patches; the hindwings are glassy, with blackish coppery border. It inhabits Queensland and (a variety) Tasmania.

The BOLINIDÆ resemble the preceding, but are without crests, and not yet recorded from Australia.

The HYPOCALIDÆ have thick, rather long palpi, with indistinct joints, and yellow hindwings with black border. They comprise but one genus with about thirteen species, of which six inhabit India and Ceylon, two South America, and one each South Africa, Australia, Hawayi, and the West Indies.

*Hypocala guttiventris*, Walker, has a stout body, moderately sized head, large eyes, and the stout palpi project like a beak. The abdomen extends a little beyond the hindwings, the stout legs have long spurs, and the forewings are moderately broad. In colour it is rusty tinted, with a slight greenish blue tinge; beneath it is whitish. The forewings partake of the general colour, and are lustrous, the dark yellow hindwings have a broad coppery black border, with a short branch in front, and a black streak near the inner margin. The abdomen is yellow, with four rows of black dots. The length of the body is about two-thirds of an inch, the span of the wings one inch and three-quarters. Habitat, Queensland.

The Catocalidæ, to which the European red and crimson underwings belong, are almost absent from Australia, and wholly so from the extra-tropical parts of South Australia. They are distinguished by mostly large size, long antennæ, a smooth abdomen, and large wings, marked by bright-coloured broad patterns and distinct bands. The family consists of four genera, of which the typical one is by far the largest, and widely distributed over the northern hemisphere; two genera are peculiar to North America, and one to Ceylon and tropical Australia.

*Blenina accipiens*, Walker, is small, whitish-grey, speckled with black, and the greyish crested abdomen yellow. The short forewings are clouded, and have several narrow transverse zigzag lines, the hindwings copper-brown, with a yellow stripe in the middle and yellow fringe. One variety has the zigzag lines of the forewings nearly obliterated, another a broad white band near the base. Its body is about half an inch long, and the wings span over one inch.

The Ophideridæ resemble the last, but have spathulate palpi, spiny legs, and sharp-pointed forewings. Of the six genera the typical one is again by far the richest in species and most widely distributed, but chiefly over the southern hemisphere.

*Ophideres fullonica*, L., is over an inch long, and between two and three in span. The general colour is rusty grey, and that of the abdomen yellow. The forewings are marked dark and pale, and have usually a white spot about the middle. The hindwings are deep yellow, with broad black lunules and margin, varied by white blotches near the latter. The species is found in Northern India, Ceylon, West Africa, Queensland, and some of the Polynesian Islands.

*O. cajeta*, Huebn., is brown, with yellow abdomen and a green spot near the base of the forewings; the hindwings have a black lunule in the middle and a black tip. Besides these and other marks the male has some black and white lines across the forewings, while the female has three slanting pale bands instead. Its distribution is nearly the same as that of the last.

The Patulæ comprise four families, three of which are represented in Australia, and one at least in South Australia. The moths are mostly large, and have broad one-coloured wings; some are adorned with eyespots.

The Erebidæ have the wings marked by transverse lines, and the forewings mostly with two promiscuous spots. They comprise about 16 genera, one of which extends to Australia.

*Oxyodes tricolor*, Guén., has wings of moderate size, both pairs rather similarly coloured and marked, a rather slender body, and the third joint of the palpi almost linear. It is reddish to brown, the abdomen yellow to dark reddish. The forewings are greenish, in the typical variety marked with dark, undulating, transverse lines and a black patch in place of the round spot; below they are rusty at the base, and have a large black spot. The hindwings are short, bluish black, the hinder half broadly rusty. Another variety has a white oblique band and a white dot; a third a black band instead of the white, &c. Its habitat is Queensland, India, and Ceylon.

The Ommatophoridæ have a stout body, and are distinguished by a large eyespot above the middle of the forewings. They comprise about eleven genera, of which two are restricted to Australia, and none extends either to Europe or America.

*Dasypodia selenophora*, Guén., is very common in most parts of South Australia. It is rusty brown above, paler below, has a stout body, conical abdomen (not much extending beyond the hindwings), very hairy forelegs and thorax, and long, slender, bristle-like antennæ. The wings are strong, gently curved in front; the border slightly oblique and toothed. The large eye-spot forms a half moon, the opening, occupied by a black spot, is turned towards the outer border, and consists of a narrow concentric brown and a metallic blue line on a black ground. Just in front of the eye-spot are three narrow blackish transverse zigzag lines, and behind an indistinct short dusky bar. The hindwings are of the same colour as the forewings, and have an indistinct dark undulating transverse band nearly in the middle formed of two narrow parallel lines. At the end of the veins along the border of both pairs of wings minute bluish white points appear. Underneath there is a small round black spot in each wing. The male is smaller and paler than the female, the latter being about one inch long, and spanning nearly three inches.

The caterpillars are brown, slender, cylindrical, and measure over two inches in length when full grown. They feed on the leaves of Eucalyptus leucoxylon (white gum), and perhaps other similar species, usually frequenting moderately high situations, seldom low shrubs. Apparently, they are mostly in small companies on the same branch, by day resting closely pressed against one of the stouter twigs, which they resemble so much in colour that they are seldom detected, and feed at night. When full grown (about September to October) they disperse very widely in search for a safe place to undergo the change into the chrysalis, even entering human habitations, &c. Ordinarily they do so under loose pieces of dead bark near the base of the trees, occasionally up to a dozen, where each spins for itself a thin transparent web of brown silk. The pupa is of a dull blackish-brown colour, not much tapering, with a small spine at the end, and requires several months for its perfection. The moths emerge during the hottest parts of the year, from the end of December till that of February, and live several weeks, sipping the nectar of the flowers of Bursaria, Eucalypts, and other myrtle-like shrubs at night, when they frequently invade lighted rooms. When at rest they sit with their wings spread out flat, always selecting the darkest places they can find, as under bark, in small caves, rabbit warrens, barns, dwelling-houses, &c. I have seen more than a score in a schoolroom in the country morning after morning. However, when disturbed they can fly very well in daylight. The species extends to Tasmania and New Zealand.

*D. cymatodes*, Walker, resembles the above, but has an additional dark white-bordered band near the outer margin, and black dots along the latter. It inhabits Eastern Australia.

*Carthœa saturnioides*, Walker, is larger than the preceding, grey above, and yellow below; the head and abdomen are also yellow. Both pairs of wings have large eye-spots and a curved white band near the border, which shows also on the underside; the spaces between eye-spot and band are rosy tinted. The eye-spots are reddish-yellow, with a black border above, and deep black with blue marks below. Habitat, Eastern Australia.

*Sericéa spectans*, Guén., belongs to a genus not exclusively Australian, but extending to Southern Asia and S. America. It is a moderately large moth, of rusty brown colour above and below, all the wings short, rather indistinct blackish brown transverse lines and a dark brown double line near the border, which latter is distinct in the hindwings. The eyespot of the forewings is incomplete with a black pupil and blue markings. The hindwings have two white marks. The species is found in Tasmania and the eastern colonies.

*S. diops*, Walk., is much like the above, but, besides other marks, the thorax has two brown bands; the eyespot is represented by a white mark, and the outline of another is seen between it and the front margin; the submarginal band of the hindwings is very distinct. The body is over an inch long, and the wings span about two inches and a half. It inhabits the Northern Territory of S. Australia.

*S. anops*, Guén., resembles the above, but has no eyespot in the wings. It occurs in Queensland, India, and Ceylon.

*S. parvipennis*, Walk., with five dark brown bands on the thorax, and rather narrow wings; inhabits Ceylon and Java, and *S. pœcila*, Guén., is a native of Brazil.

The HYPOPYRIDÆ are somewhat smaller than the preceding, have the bright-coloured wings, with a red or rusty underside in various shades and marked with black lines or bands. Of the five genera, two extend to Australia, but none to Europe.

*Spiramia revolvens*, Walk., is a little under one inch in length, and spans a little more than two inches. It has a stout body, long, vertical palpi, and moderately broad wings, the first pair ocellate. The prevailing colour of the male is brown, the body above blackish, the tip of the abdomen and the underside bright red; the basal half of the wings is blackish brown, and the paler exterior part marked by four dark brown lines. The eyespot is distorted, partly white, and bordered deep black. The female is pale brownish yellow; the head and forepart of thorax blackish, the abdomen banded black, and the wings have seven brownish lines, of which the first, fourth, fifth, and sixth do not extend to the hinder pair. Its habitat is the Northern Territory of S. Australia.

*Sp. recessa*, Walk., is brown above, pale yellowish beneath, and has a narrow eyespot, bordered deep black, which interrupts a dark brown band with indistinct margins. It is nearly of the same size as the preceding, and inhabits Queensland.

*Calliodes orbigera*, Guén., is greyish blue green, the wings have several blackish bands, a white band in the middle, and a large, white-bordered eyespot. The abdomen of the female is red, with black bands and spots. It also inhabits Queensland.

The BENDIDÆ are distinguished by the very downy forelegs of the males, and the curved or falcate forewings marked with mostly straight lines near the border. Three of the five small genera are found in India, the others in North and Central America.

The SERPENTINÆ are distinguished by a broad abdomen, and by the moderately long third joint of its palpi never being dilated towards the tip. Of the five families the first is by far the largest, and extends over the whole earth nearly; of the others two are represented sparingly in Australia.

The OPHIUSIDÆ are of moderate to large size, with a stout body and pointed wings, not very downy legs, and moderately long, ascending palpi. Of the nine genera represented in Australia, one is endemic, the others widely distributed.

*Lagoptera orbifera*, Walk., is an inch long, and the wings span two inches and a half. It is brownish yellow above, paler beneath, the abdomen scarlet, and the forewings speckled black, the underside having a blackish patch in the middle. The hindwings have a large round spot and a broad border, both deep black. It occurs in Northern Australia. The genus extends to Asia and South America.

*Ophiodes basisignum*, Walk., is considerably smaller than the last, has similarly coloured wings, and the third joint of the palpi rather long. Its colour is pale brownish-yellow. The forewings have some five or six black marks near the base, a pale, almost straight, brown-bordered line near the middle, and a brownish wavy band near the border; the hindwings a brown band and border. Habitat Eastern Australia.

*O. disjungens*, Walker, is grey above and yellow below, and has a yellow abdomen. It is larger than the last, and inhabits Queensland.

*Ophyx ochroptera*, Guén., is brownish yellow; the sides of the thorax and the first and third pair of the legs are blackish brown; the wings have white dots along the border, and black lines in common. Of the forewings the basal half is paler than the rest, and they have a wavy white line bordered brown near the outer margin; the hindwings are marked with slight blackish streaks. Another species, *O. bipartita*, Guén., resembles the last, but is pale ochre grey above, and darker below. The genus is peculiar to Australia.

*Cerbia partita*, Walk., has the tips of the wings rounded, and the tip of the third joint of the palpi almost clublike. It is dull greyish-yellow, has a grey abdomen, and on each wing, besides some other marks, a broad blackish-brown band near the border. The hindwings are whitish. It is about three-fourths of an inch long, spans nearly two, and inhabits the northern parts of Australia.

*Ophisma gravata*, Guén., is pale dull yellowish; the subfalcate forewings have a purplish tinge, black speckles, and two faint dark bands. The hindwings are pale, with a very broad black band. It occurs in Queensland and India, and seemingly extends to South Australia.

*Naxia hamatilis*, Guén., is brownish yellow, the thorax marked with white transverse lines, and the rather broad purplish forewings with two yellowish grey lines, a pale band, black marginal dots, and a brownish border; the hindwings are blackish brown, with an incomplete band and a pale border. Habitat, Queensland.

*N. propyrrha*, Walk., is purplish brown, and has the head and part of the thorax and forelegs bright yellow. It is about three-quarters of an inch long, and the wings span nearly two inches.

*Ophiusa senex*, Walk., is about two-thirds of an inch long, and spans one inch and a half. It is pale yellowish-brown, has a stout body, broad untoothed wings (of which the first pair is rather sharp pointed and the other long), and moderately stout hairy legs, with long spurs to the last. The forewings are dark coppery-brown, and the greenish or bluish tinged exterior part separated from the basal by a whitish wavy line and an upright whitish band across the middle; there are also blackish spots near the tip. The hindwings are brassy brown, with a whitish band, and have a partly white fringe. It inhabits Northern Australia. The larger reddish-brown *O. pyrrhargyra*, Walk., with yellow about the underside of thorax and forelegs, and silvery white bands, hails from New South Wales.

*Fodina ostorius*, Walk., is considerably smaller, and blackish brown. Its body is rather slender and smooth, the palpi compressed and obliquely ascending. The head is marked with two yellow lines, the palpi are yellow beneath, the thorax has a yellow line in front, and the abdomen is banded with yellow. The forewings have some peculiar white bands and streaks, and a fawn-coloured spot at the hinder end of the former, while the hindwings have a yellow spot in the middle, and the fringe partly white. It inhabits Eastern Australia.

*Grammodes oculicola*, Walk., is under two-thirds of an inch long, and scarcely one and a half in span of wings. It is brown, the underside white, with broad brown bands, and the abdomen grey. The forewings have two yellow transverse bands, the outer one abbreviated near the inner margin, and emitting a curved streak towards the inner one; a fawn-coloured band between this streak and the inner angle includes a black spot bounded by two bluish lines; there is also a pale brownish streak along the border of the wing, and a grey fringe to be noted. The hindwings have a white band across the middle, thinning out towards the inner margin, and a partly white fringe. Walker, after whom the preceding description is given, cites New South Wales as the habitat.

In the early part of March, 1887, Mr. Greenwood collected several specimens of a species resembling the above at Beltana (S.A.), but as the writer cannot make Walker's description quite fit it will be separately described under the following provisional name.

*G. ocellata*, n. sp. The male is black, the female blackish, both with a faint coppery tinge; the abdomen of the male has a grey tint, that of the female is wholly grey. The forewings have two broad, transverse bands, pale yellowish in the male, nearly white in the female, which are nearly at right angles to the front margin, and divide it into three nearly equal parts. The inner band is the broader, and of nearly equal width, the outer one straight on the outside and curved on the inside from the middle, the pointed end touching the border near the inner angle. At the latter is a large oval eyespot, bounded by a narrow line, partly double, of the same tint as the bands; the enclosed space deep black, with numerous scattered blue scales, and immediately adjoining the narrow pale yellowish fringe. The white discal band of the hindwings has the inner margin nearly straight and the outer curved, sometimes notched, contracting it much towards the inner margin. The broad fringe is white, with a short deep black space in the middle. On the underside the base of the wings is broadly white, with a narrow black wavy band in the hindwings; the outer band of the forewings is reproduced beneath, but pure white, broader, and somewhat modified in form, as is also the fringe. The body and legs are white. The female measures three-quarters of an inch in length and one and three-quarters in span; the male is smaller.

*G. justa*, Walker, is brown, the abdomen and the underside tinged greyish. The most important marks on the forewings are two slender, oblique, white bands, connected by a white line behind, and on the hindwings a slender white band in the middle. Habitat, Queensland.

The Euclididæ are distinguished from the other families of the Serpentinæ by short palpi. Of the six genera only one, and that in a single doubtful species, appears to be represented in Northern Australia.

*Euclidia* (?) *alterna*, Walk., is pale reddish-yellow above and very pale yellowish beneath, where the wings are marked besides with two blackish bands. The forewings above have five blackish and brownish lines, besides some black dots. The hindwings have a narrow band and a broad border, both brown, the latter including two fine pale lines. It is under half an inch in length and not much over one inch in span.

The Poaphilidæ have moderately long palpi, but a slender body. One of their thirteen genera occurs in Europe, one in Java, one in Natal, the rest in America.

The Remigidæ are chacterised by very downy legs. They are of moderate size, and chiefly at home in America, as of eleven genera, only three occur elsewhere, viz., one each in India, Natal, and Queensland.

*Girpa aliena*, Walk., is nearly half an inch long, and spans one inch and one-sixth. It is grey, speckled black, and the wings marked by some faint blackish lines, the forewings having besides a broad, hoary streak near the tip, the round spot indicated by a black dot, and the kidney-shaped spot by a small blackish annulus.

The eighth tribe is separated into two subtribes, viz., Pseudo-Deltoidæ and Deltoidæ proper, or Deltoidites, resembling the Pyralidæ more or less in structure. Both are only of moderate or small size.

The Pseudo-Deltoidæ differ from all the preceding ones by a slender smooth body, very long ascending palpi; long, mostly smooth legs, and contracted one-coloured wings, which are, however, usually and distinctly marked on the under side. They comprise two small and one very large family, of which only the last appears to be sparingly represented in Australia.

The Focillidæ and Amphigonidæ have both angular wings, the former being distinguished by the third joint of the palpi being long and filiform, and the abdomen downy, while the latter have hatchet-shaped or much recurved palpi and a smooth abdomen. They comprise respectively six and five genera, most of which are American and Indian.

The Thermesidæ have entire or (rarely) toothed wings, a pointed tuft of hairs between the eyes, and the long ascending palpi advanced in front. Their antennæ are more or less bristly according to the sex, and the wings large. Of some 40 genera a few peculiar ones occur in Northern Australia.

*Setida quadrisignata*, Walk., is about half an inch long and spans slightly over one. It is pale fawn, with scattered black speckles, black transverse undulating lines, and a black spot on each wing. The hindwings are similarly marked, except that the forewings have small black spots along the front margin at the ends of the lines.

*Olyssa calamitosa*, Walk., is rather larger, spanning an inch and a quarter, rusty brown above, and grey beneath, and all the wings with black lunules along the border. The forewings have three blackish transverse lines in the middle, a much darker one near the border, and a broad grey band; the hindwings have fewer lines.

*Niguza spiramioides*, Walk., is rather slender, spans over an inch and a half, and is pale fawn. The wings have five black lines, some indistinct, and the outermost wavy above and two black spots below, the forewings, besides a large black eye-spot, dotted white.

The Deltoidites resemble the preceding, but have the palpi compressed, always directed upwards beyond the head, and the third joint often forming an elbow with the second, sometimes even turned back and laid along the thorax. The wings are large, always worn flat at rest, and the hindwings not entirely covered by the forewings. Of the three families the first is small (seven genera), the second large (some twenty genera), the third very large (over sixty genera).

The Platydidæ have angular wings, and the long ascending palpi much extending over the head; the third joint is often dilated. Four of the small genera occur in South America, the other three in India, none in Australia.

The Hypenidæ have entire wings, and the front of the head projecting prominently and acutely. One genus is endemic in Australia, another common to Australia and Asia, and a third (Hypena) extends over all the continents, with its eighty or ninety odd species.

*Dichromia duplicalis*, Walk., is half an inch long, and spans nearly one inch and a half. It is greyish black, and has a yellow abdomen, with small black crests, and some black hairs at the tip. The forewings are pale grey and blackish brown, with a very large blackish patch and an oblique band, interlined and speckled bluish green, and also two black dots. The hindwings are yellow, partly with a black border, a deep black marginal line, and yellow fringe. It inhabits Queensland.

*Rhodina falculalis*, Guén., is a slender rosy tinted moth, with a whitish abdomen, and long straight beak-like palpi. The forewings are acute and sulcate, with an exterior pale wavy line, the discal mark and two series of points along the border black. The hindwings are greyish, with several double-whitish lines and black points near the border. It is peculiar to Australia.

*Hypena mancipatalis*, Walk., is under half an inch long, and spans less than an inch. It is bright fawn, the wings are falcate, but the palpi not beak-like. The abdomen is grey, and the joints of the feet are tipped with white. The forewings are sprinkled with black, and have a line towards the border formed of white dots, and a row of black points between this line and the border. The hindwings are grey, with several indistinct darker lines, with some dots above and beneath some black speckles; also a black dot in the middle, and another larger one near the inner angle.

The Herminidæ resemble the preceding family, but have the front of the head neither prominent nor acute.

*Anemosa isadasalis*, Walk., is a small rosy grey moth, the forewings speckled black, and with two black transverse lines. The hindwings are pale yellow with rosy border. It inhabits Queensland.

*Sophronia cæneusalis*, Walk., spans about one inch, and is greyish fawn. The second joint of the palpi is recurved; the marks of the forewings are only a little darker than the ground colour, consisting of three distant lines, which are more distinct on the underside.

*S. carbonalis*, Guén., is greyish black, with dusky white lines, which are almost parallel; the hindwings are paler, with darker lines. This species is reported from Tasmania only.

*Bocana metisalis*, Walk., is brown, under half an inch in length, and less than one in span. The basal part of the forewings is brown, bounded by a line, and a brown, wavy, submarginal line with a white mark at each tooth; the kidney-shaped spot is denoted by a black lunule, which is most distinct beneath. The hindwings are brownish-grey, with similar lines. It is a native of Queensland.

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## PYRALITES.

The Pyralites are a somewhat ill-defined division of moderate sized or quite small moths, regarded by some as the first of the Micro-lepidoptera, to which they undoubtedly show great affinity; but as many species attain a considerable size, they may as well form the last of the Noctuidæ, as in Walker's Catalogue. In this work they are divided into four tribes, and these into a varying number of families. However, as they are by no means conspicuous in South Australia, or rather, in South Australian collections, only such species as are remarkable for their common occurrence will be fully described. A large number of genera and species are recorded for the warmer eastern colonies.

The Pyralites are distinguished by a slender body, short proboscis, moderate-sized palpi (which are sometimes beak-like, but never reflexed), slender antennæ (often long), short thorax, long abdomen (according to sex either pointed or conical), long legs, and narrow, entire, shining wings. These are often half transparent or iridescent, and placed flat on their support during repose or extended backwards, but never elevated or wrapped round the body.

The first tribe, Squamosæ, resemble Noctuites, and are distinguished by the connected free costal and subcostal veins, the latter not including the areolet of the hindwings. The few species of the only family, *Odontidæ*, are natives of Europe and Africa.

The second tribe, Pulverulentæ, have no free costal veins (along the front margin) in the hind wings, and separate into two families, of which the first is large and widely distributed, the second, Cledeobidæ, almost wholly European.

The PYRALIDÆ have a very short proboscis, which is sometimes quite undeveloped, short variable palpi, and the three interior veins of the hindwings free.

*Pyralis farinalis*, Linn., the "Meal-worm Moth" of Europe, is very commonly met with in outhouses, kitchens, and even on trees in the field. Whether native or introduced is hard to say, as the writer already met it about 1854 as commonly as now in the country. It is a slender moth of about one inch in span; the forewings are dark-brown at the base and outer border, this tint being sharply bordered by much-curved white lines continued across the dark-grey hindwings. The abdomen is banded and varied black. The larvæ live in meal, bran, and all sorts of moderately dry powdered vegetable refuse, even in closets. The moths fly from about October to April.

Several Pyralis species are very common either in the hill districts or grassy fields, but for want of a name a short description has to be given.

*Pyralis* sp., No. 1, is about half an inch long, and spans over an inch, at least the female. The thorax of the latter is dark blackish-brown, with some pale streaks, the abdomen grey or hoary, with four pairs of dark round dots upon as many segments, commencing with the second, and a partly dark tip. The base of the forewings is brown, with some fine dark and pale transverse lines; then follows a broad yellowish-brown band, straight on the inner, wavy on the outer margin, succeeded by a still wider wavy dark-brown band, with a blackish dot towards the front and a ring towards the hind border; the rest of the wing is of the same tint as the first pale band, and has a fine wavy, very dark line near the border; in the pale parts fine wavy, slightly darker lines can be distinguished. The hindwings are greyish, with many slightly darker transverse lines, and a similar dark line near the border as the forewings. The species is very common during spring and summer in the scrubby parts of the hills, for example, about Balhannah, according to Mr. E. Guest. The male is grey instead of brown.

*Pyralis* sp., No. 2, is very much smaller, and grey, but of the same type of markings, though differing in detail. It occurs frequently in the mallee scrub and adjoining grasslands, as well as in other open fields. Both kinds usually sit on leaves, bark, &c., on or near the ground, with extended wings, but are easily roused to short low flights.

*Loryma sentiusalis*, Walk., is about of the same size as the last, and brownish grey speckled with black. The forewings have an oblique line from the base of the front margin to the hinder angle, where it joins the black marginal line. The hindwings are whitish, with a dark grey border. The tiny moth is a native of New South Wales.

The third tribe, LURIDÆ, have the wings somewhat extended during repose, and an areolet included by the subcostal vein of the hindwings. Most of the eight families are not only represented in Australia, but in most parts of the world.

The HERCYNIDÆ resemble very small Noctuas, and the dark clouded wings have well defined marks below. The seven genera are all European, one extending to Asia minor.

The ENNYCHIDÆ have bright-coloured wings, well marked below, and resemble Pyralis in form. They have a world-wide distribution, two genera, at least, extending to Australia.

*Rhodaria lancinalis*, Guén., is pale yellow, the head, thoracic tufts, and abdomen are rosy tinted, the latter somewhat dusky, and with whitish marks on the back. The forewings are very long and narrow, with very oblique border, the front margin bright and the hinder half dusky rosy; in the middle are two large square marks the inner area of which is metallic purplish and leaden. The hindwings are short, and pale greyish rosy. The part of Australia it hails from is not recorded by Walker, and the writer has not seen it. The genus extends widely.

*Ennychia melissalis*, Walk., another Australian, is coppery or greyish black, with a white streak near the base and a white oblique band in the forewings, the white lines and banded abdomen being the generic characters.

The ASOPIDÆ are mostly small, the four palpi conspicuous but not beak-like, and the underside of the wings is either not marked at all or inconspicuously so. They are found in all continents, but principally in America. Some of the species are of considerable size, and peculiar form of wings. Four or five of the twenty genera occur in Australia, but none exclusively so.

*Ædiodes amathealis*, Walk., is yellow, and less than an inch in span. The greater part of the wings is grey, and marked with an interrupted black marginal line beside some brown and whitish ones. It is reported from Queensland.

*Salbia amphicedalis*, Walk., is ashy brown, coarsely scaly and spotted black. The wings are white, copper-brown between the outer black line and the border, and also marked with some other black lines and spots. It spans three-quarters of an inch, and occurs in New South Wales.

*Asopia venialis*, Walk., is greyish white, tinged yellowish, *A. hipponalis*, Walk., yellow, and *A. lydialis*, Walk., purplish brown, yellow beneath;

the wings have two more or less toothed or wavy lines and some dots. All are under an inch in span, and hail from Queensland.

*Endotricha pulchrinalis*, Guén., is yellow, the sides of the thorax reddish, and the abdomen rusty with a yellow base. The reddish forewings have two nearly parallel white lines bordered black, and the hindwings a broad black border beside the lines. New South Wales. *E. pyrosalis*, Guén., is ochre yellow, and *E. ignealis*, Guén., dark red.

The Stenidæ resemble the preceding, but have the palpi beak-like. Of about a dozen species two are exclusively Australian. They have a slender body and large head and eyes.

*Sedenia cervalis*, Guén., is reddish or ochreous white, the proboscis is not conspicuous, and the maxillary palpi are obsolete. The forewings have some very indistinct lines and are partly reddish pink; the hindwings are pale with a reddish pink border.

*Carcantia pterophoralis*, Walk., is brownish grey, head, face, and the pectus white; it spans about three-quarters of an inch. The slender body combined with very long palpi, antennæ, and legs forms the generic distinction. The forewings have two slight, short, oblique bands and a streak in the disc, all irregularly bordered with black. The hindwings have similar but very faint marks. Locality uncertain.

The Hydrocampidæ are small, delicate moths with rather large silky wings, and their larvæ inhabit or live upon plants, which grow under, in, or near water. Besides this character and a short proboscis they resemble the preceding families very much. The abdomen extends beyond the hindwings, the legs are long, slender, and smooth, the last pair being usually furnished with four long spurs. Of the nine or ten genera two of those most widely distributed occur in Australia.

The genus Cataclysta is distinguished by bright-coloured eye-spots near the border of the hindwings.

*Cataclysta glycerialis*, Walk., is white, and measures about two-thirds of an inch in span. The head and thorax are brown with white shades along the sides, the forewings very sharp pointed, with the front ochre-coloured edged black, four ochre-coloured, black-edged bands which are repeated in the hindwings, but irregularly. It occurs near Sydney and elsewhere.

*C. lampetialis*, Walk., is also white, but smaller and has the abdomen banded with ochre and brown, part of the forewings tinged silvery, and the hindwings marked with five deep black marginal dots. This, and a third species, are reported from Queensland.

*Hydrocampa* has broad wings, a rather short proboscis comparatively, and distinct eyelets (ocelli) close to the eyes.

*H. tullialis*, Walk., is rusty brown, and spans over one inch. The abdomen is brownish grey. The forewings are acute, and have two shady pale lines formed of white speckles; the white hindwings have three brown stripes. The locality is uncertain.

A species resembling somewhat the European *Hydrocampa stagnails*, Guén., was obtained from Mr. James Hill, Kewell East, in N.W. Victoria, where numerous depressions occur, containing shallow stagnant water for several months. It spans fully one inch, is pale brownish, and the abdomen yellowish above and silvery white below. The forewings have a number of irregular white spots, some black dots adjoining them, and a very fine black wavy marginal line. The hindwings are white at the base, followed by a dark brown band, succeeded by a broad white, and another brown one, both bordered blackish. Then comes again a white band, narrower behind, and scolloped outwards; the space beyond is of the same tint as the forewings, and includes three oblong white spots in the middle of the border, of which the second contains a small brown ring with a white centre, and the third a brown dot; some small white spots towards the hind angle, black marginal dots, a fine white marginal line and black-tipped fine fringe complete the description. If it should turn out new, the specific name H. Hillii is suggested.

## PYRALITES.

The following three families are distinguished by mostly moderate, sometimes even large size, variable palpi, and a well-developed proboscis. The two first besides have the wings either not marked by lines at all, or only inconspicuously so.

The Spilomelidæ have very conspicuous labial (lip) palpi, broad, with indistinct joints, and the maxillary pair quite obsolete. Their body is slender, abdomen and legs long, and the smooth shining wings similar in colour and markings. Of the seven or eight genera, three are represented in Australia.

*Lepyrodes iolealis*, Walk., is greyish brown above and white beneath; also white about the eyes. It is under half an inch in length, spanning about five-sixths. The abdomen is banded with white, and that of the male extends fully half its length beyond the hindwings. The wings have three irregular oblique white bands formed of spots, a blackish border and brownish fringe, with a white base. It occurs in New South Wales and Queensland, &c.

*Phalangiodes neptalis*, Huebn., is pale ochre-coloured, the thorax and abdomen banded white, and the forewings with various white semihyaline spots bordered brown. The forelegs are covered by velvety hairs in this genus, while they are bare in the preceding. The species is reported from Queensland, and extends to India and Canada.

*Zebronia plexippusalis*, Walk, is white, only one quarter of an inch long, and spans about two-thirds. The fore tibiæ are banded black; the abdomen has a black dot on each side near the base; the forewings three near the base besides a number of others, and the hindwings four at some distance from each other. It lives in Queensland.

The Margarodidæ have all the four palpi conspicuous and beaklike, and the tuft at the end of the abdomen frequently of two colours, as is also the case with the broad rounded palpi. The wings are semihyaline or iridescent, mostly devoid of markings, though often bordered. Of about twenty genera, three occur in Queensland, and perhaps elsewhere.

*Leucochroma tolumnialis*, Walk., is yellow, white underneath, and spans about one inch. The head and two lateral spots of the thorax in front are brownish; the forewings have two deep yellow stripes united at the base, and at the broader ends join two similarly tinted bands, which near the front margin merge in a brown patch, besides other marks; the hindwings have a short deep yellow streak towards the base, a patch near the border, on the outside of which are two deep black dots with some golden spangles. Habitat, N.S. Wales, the genus extending to South and Central America.

*Phakellura Indica*, Guén., is white, the wings iridescent, with a broad brown border, and the head, the palpi, and thorax marked brown; also two of the abdominal segments. Chiefly at home in Africa and Asia; it extends to Queensland.

*Margaronia arcusalis*, Walk., is white, and measures two-thirds of an inch by one and a half. The palpi, forelegs, and the thorax in front are marked with reddish-yellow; the antennæ are ochre-tinted, the very shining white forewings have a brown border, a much curved brownish mark in the middle, and a brownish frontal margin; the hindwings are very slightly yellowish along the border. Its habitat is Queensland.

The Botydæ have a rather slender, smooth, scaly body, the palpi often beaklike, with generally indistinct joints, but the second pair often obsolete; the antennæ various, mostly simple or finely hairy, sometimes comblike. As a family they are distinguished by the rather large shining wings having the usual lines, but the anal tuft when present being only of one colour, or altogether absent. Of the twenty odd genera extending over all continents, some seven or eight are represented in Australia, but only one appears to be endemic according to Walker.

*Astura clytusalis*, Walk., spans rather more than three quarters of an inch, and is deep yellow. The base of the palpi, a dot near the tip of the abdomen, and the bands of tibiæ and tarsi of the forelegs are black. The forewings have three black bands, of which the second and third are wavy, with a black dot between them. The hindwings have one band near the border. The species inhabits N.S. Wales, while the genus extends to Borneo, India, and Brazil.

*Botys pharaxalis*, Walk., is nearly half an inch long, and spans fully one. It is brown above and whitish beneath. The greyish brown moderately broad wings have blackish undulating lines, a brown border with a pale marginal line, whitish fringe, brownish at the base. It is recorded from N.S. Wales and Queensland. The genus is one of the largest, Walker recording alone between 300 to 400 species, including more than a dozen from Eastern Australia. It is distinguished by the not much ascending palpi, of which the maxillary ones are mostly indistinct, and the third joint of the others not very distinct.

*Botys sp.* This South Australian species, for which there is no name as yet, spans about one inch, and is brown and yellow. The head and thorax are blackish, the abdomen grey, with darker narrow bands; the antennæ brown, pectinated. The forewings are bronzy brown, with five narrow wavy, silvery white lines, bordered dark, the fourth being very sinuous, and some dark irregular rings between the second and third, with whitish centres. The space between the fourth and fifth and beyond the latter is much darker than the rest, and the fringe alternately dark and pale. The hindwings are yellow, with very indistinct darker bands towards the blackish border; the broad fringe is also alternately blackish and white. The underside is pale fawn with a short blackish submarginal band, some very narrow and indistinct interior wavy lines, and a minute black dot near the middle in all the wings. This species is rather common in scrubby localities of the hill districts during spring, and resembles in pattern some of the European congeners.

*Scopula itonusalis*, Walk., spans about five-sixths of an inch, has a slender body, and is whitish, the thorax being rusty on each side in front. The rather narrow forewings are pale-ochre tinted, very acute, and with oblique whitish zigzag lines; the hindwings whitish. Walker reports it from Adelaide, but the writer has no specimen. The genus, with over 50 species, extends over all continents.

*Sceliodes mucidalis*, Guén., has the maxillary palpi not distinct, but the third joint of the others very much so, which separates it from *Botys*. It is dirty yellowish white; the forewings have a large brownish red spot towards the tip, black bordered on the inner side, large discal spots olive brown at the base, and blackish streaks along the front margin about the tip; and the paler hindwings have a discal spot formed of contiguous blackish dots, and an apical diffuse spot. Its habitat in Australia is uncertain.

*Mecyna ornithopteralis*, Guén., has the palpi forming a long straight beak, much exceeding the head, and spans nearly three-quarters of an inch. The body is rusty to blackish brown, white below, the abdomen yellowish brown. The wings below are deep yellowish, with a broad brownish border. The forewings are greyish or bluish brown, with a dark band, near the middle of which the outer border is much bent, a very fine black zigzag border line, often reduced to points, and some darker patches between. The hindwings are deep yellow, with a broad black border scarcely undulating on the inner side. It is moderately common in the scrubs of the Mount Lofty ranges, flying about fitfully in the late afternoons in September and October together with the following species. The species extends to New South Wales and Queensland.

*M. polygonalis*, Huebn. (?), is considerably larger than the preceding, and extends to southern Europe and Madeira, but we doubt whether our species is the same. The forewings are sharp at the tip, reddish brown, the front margin somewhat rosy, and the lines reduced to a short series of black dots, the inner ones indistinct; the kidney-shaped spot is small, blackish, with a minute white centre in the females. The hindwings are deep pure yellow, when alive, with a broad black border, much curved on the inner side, but not reaching the hind margin.

A variety has the forewings dark brown, with a broad, hoary band towards the border, and a yellow abdomen.

The underside of the forewings is greyish yellow, with a broad, triangular, brown tip, a short black bar. That of the hindwings is similar to the upper, only less bright. It is sometimes very common in the open grass lands in the hills, and has also been obtained from north-western Victoria. The deep yellow fades gradually after death under the influence of light and becomes pale grey with all the species.

*Godara comalis*, Guén., spans about an inch, and is pale yellowish white beneath. The wings have some black points near the border, the forewings are marked by indistinctly toothed lines formed of brown speckles irregularly spreading over the whole surface, and two white dots in place of the kidney-shaped spot. The hindwings are white, brownish towards the tip. It extends from India to New South Wales.

*G. incomalis*, Guén., is a little larger, and pale brown to tawny, and resembles the last in the markings, but the speckles of the forewings are blackish towards the hind border. It is found in Java and Queensland.

There are numerous species besides those described above, and probably more still undescribed.

The PLICATÆ have the costal and sub-costal veins of the hindwings (those next the front margin) connected, but the wings, when in repose, are worn almost flat, the hindwings being covered by the forewings. They form a single family, the SCOPARIDÆ, which embraces some nine or ten genera, all small, except the typical one, which extends to Europe, Asia, America, and Australia. The first contains by far the most species, while America possesses the greatest number of genera.

The body is slender, the head broad, with two crests behind, but no tuft in front. The forewings are long, narrow, with blunt tips and distinct markings, but also clouded with lighter and darker tints. The hindwings are without marks, broad, and much folded, but never hyaline or iridescent.

*Scoparia australialis*, Guén., is brown, the head white with two black dots; the lateral palpi black, the others white. The thorax is much spotted with white, and the brownish black forewings have some yellowish white marks, some almost parallel, rather distant lines and two large spots, of which the second is marked with black. The blackish grey hindwings have some obscure marks in the middle, and pale fringe.

*S. objurgalis*, Guén., is blackish grey, and the forewings marked with white dots and scales and lines. Walker only gives "Australia" as the habitat.

A third species, *S. obtatusalis*, Walker, hails from Queensland. It is white, with grey forewings, with whitish lines and marks, and spans less than three-quarters of an inch.

## GEOMETRIDES OR LOOPERS.

The name of this fine and well defined subdivision or tribe of moths, scientific as well as the popular, is derived from a peculiar and characteristic habit of the long slender caterpillars of all of the GEOMETRIDES, in respect of their locomotion. Instead of a steady continuous walk, they lift the anterior part of the body, stretch it out at full length, and grasp their support—either the ground, or twig, or leaf—firmly, then let go the hinder part, bend the body into a vertical *loop*, bringing the extremity more or less close to the fore part, and proceed thus alternately at a moderately fast pace, like *geometers* (surveyors) measuring a field. This arises from the absence of the first two pairs of prolegs and the great extension of the part of the body that usually bears them, the last two pairs being placed close to the end.

The Geometrides, in the perfect or imago state, are distinguished by a slender or moderately stout smooth body; the antennæ of the males frequently pectinated, and broad wings, similarly marked, which during repose are expanded flatly at about a right-angle to the body. In this position they rest motionlessly during the bright sunlight. As they always choose some support agreeing with their colour and markings, they are often quite undistinguishable until nearly touched, when they start suddenly, fly with great rapidity to a similar place —the ground, dead bark, trunks of trees, or leaves —at a short distance, and disappear as if by magic. Some, however, of the larger ones are very apathetic, and scarcely stir while being boxed up.

They are divided by Walker into 24 families, most of which are well represented in Australia, but only the principal ones will receive here more than a passing notice.

The URAPTERIDÆ are distinguished from all the others by having the forewings very acute, and the hindwings furnished mostly with a longer or shorter tail at the posterior angle. The body is more or less slender, the palpi short, the slender antennæ velvet-hairy in the males, the legs long and stout, the wings streaky, the forewings triangular, the hind ones foursided, and more or less extending beyond the abdomen. By far the most of the species inhabit North and South America, a fair number Asia and Australia, and one *(Urapteryx sambucaria)* is European, but they are entirely absent from Africa.

*Idiodes inspirata*, Guén., is about two-thirds of an inch long, spans from one inch and three-quarters to more than two, and is of a greyish-fawn colour. The body of the male is rather slender, that of the female somewhat stout; the former, however, has considerably larger wings, and is paler than the latter. The forewings are falcate (sharply pointed), very slightly speckled brownish, with very small round black dots along the border midway between the veins, and a narrow oblique pale line starting from near the tip. The hindwings are similar by the continuation of the pale straight line and black marginal dots. The abdomen and legs are speckled black, as are also the wings beneath upon a somewhat paler ground; the latter have also the marginal dots reproduced, and a convex submarginal row of nine black spots upon the veins of each wing, and the hindwings besides, a large black discal spot sharply defined on the inner side, and almost foursided.

The moths were taken by Mr. E. Guest about Balhannah, in the Mount Lofty Ranges, and reported from Tasmania by Walker.

*Idiodes mitigata*, Guén., spans about one inch and a half, and is a delicate reddish-fawn. The forewings are scarcely falcate, slightly speckled with brownish scales, and the pale straight oblique line, very slightly bordered darker on the inner side, is almost obsolete. The more greyish underside is more thickly speckled, and the blackish marginal and submarginal spots very minute, but there is a bandlike darker brownish tinge near the top of the forewings, and the brownish discal mark, enclosing a pale streak, is very faint. The male is smaller than the female in all parts. Habitat, Balhannah, South Australia; New South Wales.

*Idiodes rinata*, Guén., is a little larger than the last, and similar in tint, the wings falcate, more thickly speckled, and the oblique line dark-brown and double in the forewings. Beneath the two rows of dark dots are almost obsolete and the discal mark of the hindwings faint. Near and parallel to the border of the hindwings is an interrupted brown band formed of more or less diffuse patches. Balhannah, South Australia.

The Tasmanian *I. apicata*, Guén., is distinguished from the others by black streaks near the tips of the forewings, and not represented in the Museum. A very small specimen of this genus (?) occurs in north-west Victoria. It is greyish-fawn, densely speckled with black, and spans a little more than one inch. The wings have each a row of black marginal points, a small black discal mark, and a rather broad, diffuse, somewhat crooked band, which near the tip curves abruptly towards the front margin. Beneath the wings are grey, densely speckled paler and darker, the upper dots and marks reproduced, but not the band.

The hindwings of the members of this genus have no appendages.

The ENNOMIDÆ, a very large family of 50 to 60 genera (about 10 or 11 extending to Australia), are distinguished by a not very slender body, proboscis and palpi conspicuous, very convex head, hairy about the antennæ, and angular wings.

*Epione incaria*, Guén., has pectinate antennæ, and is dark dirty red, with streaked wings, bordered broadly with violet grey, and a straight line in the forewings. Tasmania.

*Ellopia cumularia*, Guén., has narrow wings and very slender palpi, and is pale grey. The pointed forewings have a broad brown line divided in front and bordered pale; the line of the hindwing is very broad, and the border much angulated. Australia. The genus extends to Europe.

*Tetracis cachexiata*, Guen., is white, tinged with sulphur yellow, the forewings with a narrow straight line and the discal spots on the under side only very conspicuous; the hindwings are very angular, and the feet armed with spines. Australia.

*Onicodes traumataria*, Guén., is of a rich ochre yellow, suffused with rosy tints, and the narrow wings have a straight oblique line and other blackish marks; it resembles Ellopia, but the palpi are not slender. Australia.

*Azelina Clelia*, Guén., has broad wings, stout feet, the thighs (femora) not broad, and is grey, speckled with rusty black. The wings are marked with brownish oblique lines and glassy, black-bordered discal spots, the border being very angular. Most of the species of the genus are American, only this one being recorded by Walker from Australia.

*Tacparia zalissaria*, Walk. (N.S.W.), greyish red, speckled black, with a dark line and black points, and *Cernia amyclaria*, Walk. (Queensland), pale ochreous flesh-coloured, the usual marks, and red fringe, close the list of species for the family.

The Œnochromidæ, a moderately large family, almost entirely Australian, are distinguised by a very robust body, pointed forewings, entire hindwings not angular in the middle, promiscuous palpi, and the antennæ of the female simple and thread-like, those of the male being pectinated, except towards the tip. Most of them are of bright tints and quite ornamental.

*Monoctenia salernaria*, Guén., is of a rosy ochre tint, the wings marked by two blackish, oblique, toothed lines, the intermediate space being darker than the rest. The hindwings are toothed, the hind tibiæ have four spurs, which are placed rather closely together. It extends from Queensland to Tasmania. There are several other species.

*Œnochromia vinaria*, Guén., has the very short spurs of the hind tibiæ rather distant, and equal in size. It is rosy (or reddish) purple, the antennæ ochre-tinted, and the rusty fringed wings speckled with black, have a pale yellow oblique line, bordered red, extending from the tip of the forewings to middle of the hindwings, and a black discal spot marked white in the centre. The black blotches beneath of the forewings near hind angle are deep red behind, those of the hindwings are white with rusty marks and placed near the former on the front of margin. The male is much paler than the female and somewhat smaller. The moths are very sluggish during the daytime, resting often promiscuously upon the green foliage of shrubs, when they resemble discoloured leaves very much, drifted by the wind and entangled among the twigs. This mimicry of a highly coloured gum leaf was so strongly evinced in the case of a female captured by the author in November on a shrub of *Acacia brachybotrya* in the mallee scrub between Monarto and Murray Bridge, that it required very close inspection to detect the nature of the specimen. Mr. E. Guest captured some near Balhannah, in the Mount Lofty Ranges. It is one of our brighest moths, not common, measures about one and a quarter inches in span, and extends to New South Wales.

*Arhodia lasiocamparia*, Guén., is less than one inch in length of body, and spans from two inches to two inches and a half. The male is smaller than the female, pale grey above, and still paler beneath; the forewings (with convex front margin in both sexes) are triangular, speckled blackish, with a row of indistinct blackish dots parallel with, and at some distance from the border, which is continued as an indistinct line through the hindwings, and a short narrow blackish bar in the disk. Underneath is a deep blackish transverse half moon spot, and opposite to the inner concave side a narrow semi-circular blackish line, the space between the two being white, and that beyond to the border thickly speckled with blackish.

The female is much larger, the forewings much longer, the costa more rounded and very broad near the base. The colour above is of a uniform rosy tint, the row of dots, &c., in the specimen in the Museum scarcely distinguishable. Beneath the tint is paler and more impure, and the dark patch, &c., more diffuse. The species was captured near Balhannah by Mr. Guest, who ascertained that the very dissimilar insects really belonged to the same species. It is rather rare, and extends to Tasmania. *A. retractaria*, Walker, Queensland, is probably only a variety of the above.

*Phallaria ophiusaria*, Guén., has a thick body, the border of the wings simple, the spurs of the hind tibiæ approximate, and the tarsi (feet) spiny. The body of the female is over an inch long, and ending in a rather long point; and the wings span over three inches. The front margin (costa) is almost straight, the tip sharply pointed, and the border very convex. The smaller male is mouse-coloured, the female fawn. The wings are sparingly and unequally speckled with black, have a straight, oblique, dark rusty line, which is bordered paler on the inner side, and extends from the tip of the forewings (where it is indistinct) to the middle of the hind-margin of the posterior ones. The small discal spot of the forewings is oval, with a white linear centre; a similar short white mark is in the oblique line of the hindwings near the front margin. Underneath the wings are paler, much more thickly speckled, the line almost obsolete, and the discal spot less prominent. A pair of this species was captured by Mr. Pullman near Summerton, in the Mount Lofty Ranges, in March, 1888. The species extends to New South Wales, and is one of the largest—perhaps *the* largest of the South Australian Looper moths.

*Ph. subustaria*, Walk., grey, and *Ph. ochripennata*, Walk., ochre-coloured, are both much smaller, and hail from Queensland.

*Gastrophara Henricaria*, Guén., resembles the last in generic characters, but the tarsi are not spiny. It is pale whitish fawn; the forewings above are speckled black, and beneath partly yellow, the large deep black patch being marked with purple. The hindwings are yellow, with white border, and short black stripes toward the base. It occurs in Queensand and other parts of Australia.

*Mnesampila (Hypographa) privata*, Guén., is about half an inch to three-quorters long, spans from one inch and a half to one inch and three-quarters, and is grey to pale fawn in colours; the markings of the wings above vary very much, but those of the underside much less. The body is moderately stout, the abdomen tapering toward the end, which is furnished with brushes of hair. The hindlegs have four rather long and distant spurs. The antennæ are simple, filiform, and long. The forewings straight in front, with pointed (falcate) tip and very convex border, are more or less sprinkled with brown dots, and have two transverse, angular, or undulating brown lines, the space between usually paler than the rest, but the lines, &c., vary greatly in intensity or distinctness, and are often almost obsolete. The hindwings have no marks. The underside is paler, with a rather large blackish patch near the tip of the forewings and an indistinct transverse line across the middle; the hindwings have some small brownish spots near the border. All these vary in intensity to perfect obliteration, the last to disappear being the subapical patch. They are fairly common in the wooded hill districts about March, and then fly readily to the lamp in the early part of the evening. They were captured by the writer at Lyndoch, Nuriootpa, and Ardrossan, Y.P., and by Mr. E. Guest at Balhannah, in the Mount Lofty Ranges.

*Choara siculoides*, Walk., measures about two-thirds of an inch in length, and one inch and a half, or less, in span. It is distinguished generically by the hind tibiæ of the males being much thickened, and is greyish fawn-coloured. The falcate forewings, as well as the legs and hindwings, are speckled with blackish or brown, both pairs marked by a straight oblique line of black points, and black points along the border; the forewings have also an interior line of points and two blackish patches composed of points near the border; the hindwings a blackish spot near the middle. The species appears to occur rather sparsely in the Mount Lofty Ranges during the latter part of the year, and extends to Tasmania.

A male and female of a species approaching the the genus *Nisista*, but not agreeing with any kind described by Walker, were captured by Mr. Pullman, near Summerton, about March, 1884. They span about one inch and a half, the abdomen not extending beyond the angle of the hindwing, which is much rounded. The male, with pectinate antennæ, is pale yellowish-grey; the female (antennæ simple) is deep brownish red, the hindwings dark grey. The forewings are slightly fulcate, convex, and have a not very oblique border, an outer, not quite straight oblique line of seven small blackish dots, an inner one of two more indistinct ones, and between these a small discal spot. The paler hindwings have the line of dots very indistinct, and a very diffuse blackish spot in the disc. These markings are much smaller in the female. The underside is whitish, with a broad diffuse grey band near to and parallel with the border. The discal spot of the hindwings is much more distinct than above, that of the forewings much less. The hind tibiæ have four rather long and nearly equal spurs. No name can as yet be assigned to this species.

There are several other genera and species, but the above will have to suffice for the present.

The AMPHIDASYDÆ and most of the other families have the following characters in common, viz., a not very stout body, a conspicuous proboscis, the forewings without any translucent marks, the abdomen always one-coloured, and the antennæ of the female not comb-like, and are themselves distinguished by a very hairy body and small, scarcely conspicuous palpi. Most of the genera and species inhabit Europe and America, and only one is endemic to Australia.

*Lophodes sinistraria*, Guén., is distinguished generically by the hind tibiæ being extremely slender. It is dark reddish ochre tinted, the wings are sprinkled with black, the black oblique lines from scarcely wavy to angular in form, and the forewings have a white spot near the costa and towards the tip. The wings of the male are clouded with blackish grey, with some white dots in the forewings, those of the female pale, with whitish streaks. N.S. Wales.

The BOARMIDÆ have a slender body, small palpi, antennæ pectinated usually of the male only, but sometimes also with the female. The wings are large, and alike in colour and markings, their toothed border distinguishing the family. The latter embraces some 30 genera, distributed over all continents, of which about a dozen with numerous species inhabit Australia. Only a few species of the largest genera will be noticed.

*Boarmia cognata*, Walk., is generically distinguished by a slender body and long wings. It spans about an inch, is pale grey, speckled brownish, with a brown band on the thorax and three indistinct brownish lines on the wings, and blackish marks. The underside shows a band near the border. It occurs in N.S. Wales and Tasmania.

*Tephrosia despicata*, Walk., is over an inch in span and dark grey. The abdomen is marked by some brown dots in two rows; the clouded wings are speckled black, and have several indistinct, toothed, blackish lines and black points along the border. On the underside there is a blackish mark in the middle of each wing, but the lines are scarcely noticeable. According to Walker, this species is peculiar to South Australia, but the Museum has no specimen.

*Hypochroma occultaria*, Boisd., has large wings, and the third joint of the palpi short (generic distinction). It spans from one inch and a quarter to over one inch and a half. It is white above and below, but so densely sprinkled with black scales above as to appear grey. A band across the face and extending to some distance each side of the thorax, the eyes, the tibiæ of the forelegs, and the tarsi of all, are more or less deep black. The tarsi are marked with very narrow white bars. The hairs of the thorax are very long. The wings are marked above by three or four narrow interrupted, irregulary toothed or wavy blackish lines, more or less continued across the hindwings, but not to the border. The latter is undulating and fringed white. The wings on the underside are silky white. The forewings have two short diverging black streaks near the base; an oval transverse deep black spot in the disc near the front margin; a deep black band near the border to the seventh vein, interrupted by the sixth, and bordered white interruptedly toward the border, which is grey from the tip to a little beyond the seventh vein; a narrow oblique crimson band to the fifth vein and joining the black band; the space between the fifth and seventh vein is ochre-coloured, and beyond is a short narrow grey line. The hindwings have a broad serpentine band near the border, grey outside, deep black in the middle, some small white spots between them, and crimson border inside, and a short fine wavy blackish line in the middle. S. Australia, N.S. Wales, Tasmania.

There appear to be two broods at least in the year, the first from about October to November, the other from February to May. The individuals of the latter seem to be much the larger, inasmuch as a female of the former in the Museum collection is scarcely larger than the males of the latter. Excepting size, there is little or no difference between the sexes besides the antennæ, which are pectinate with the males and simple with the females.

The caterpillars are green, slender, and pointed, and feed upon native Cruciferæ, and perhaps other herbs. Of late they have occasionally resorted to garden vegetables. Thus a mature caterpillar was forwarded by Mr. Cadd from Yorke's Peninsula in October as having been taken from lettuce. It soon changed into a chrysalis, from which a small female emerged in November.

The moths usually are found during daytime sitting motionless upon the rails of old fences, dead timber, or even the bare ground, when they are perfectly indistinguishable, except by the trained observer on the look-out for them, the colouring of the extended wings agreeing almost perfectly with that of their surroundings. This is therefore a case of mimicry serving for protection.

Other Australian genera of Boarmidæ are *Hemerophila* (antennæ very long, second joint of palpi hatchet-shaped), *Melanodes* (wings black), *Smyriodes* (third joint of palpi filiform, wings moderate in size), *Gastrina* (abdomen crested, wing very much dentated), *Cleora* (palpi extremely slender), *Gnophos* (body slender), *Dichromodes* (feet slender), and *Rhuma* (antennæ of male simple, body slender, abdomen not crested).

*Hypochroma occultaria*, Boisduval, measures about five-eighths of an inch in body, and spans about an inch and a half, some specimens being considerably smaller. The general colour above is grey, produced by numerous black speckles upon a white ground. The wings are distinctly scalloped; along the border and between the whitish fringe is a fine black line; next to, and parallel with, it, an indistinct undulating pale line, succeeded by three undulating and partly interrupted black ones, of which the second and third are more or less continued across the hindwings, the last only for a short distance. The hair-like scales of the thorax are very long, and the antennæ of the males pectinate. Underneath the body and wings are silky white, except a broad band next the border, which is brownish grey, with a row of white spots, &c., in the forewings, and shading into black and crimson successively in the hindwings. The forewings, besides, are marked successively by a broad, deep, black band parallel with the border, much narrower behind, a short, narrow, crimson bar at right angles to the front margin, an oval deep black spot near the middle of the wing, and two diverging blackish streaks near the base; the triangle between the first and third branch of the medial nervure and the outer black bar is fawn coloured. The moths fly in

November and February, there being evidently two broods, and usually are found by day resting with extended wings upon hoary logs, old fences, &c., when their colouration is found to agree so well with that of their resting place that it is difficult to distinguish them. They are widely distributed.

The Boletobidæ, included by Kirby among Deltoidæ, are slender, and have a rough forehead (not tufted), very long, straight palpi, and variable antennæ. The legs are long, the hind ones with four spurs, the wings stout and entire, the forewings with the tip blunt. This family is very small, its three genera of one species each occurring respectively in Europe, S. America, and N. China, and no representative in Australia apparently. The larva feed upon low fungi on the ground.

The Geometridæ are distinguished by having the wings never dentate and their almost universal green colour. The antennæ of the males are usually pectinated, while those of the females are very much less toothed or quite simple. The family is well represented by seven or more genera, and each by several or numerous species; the following are examples of South Australian species:—

*Iodis vertumnaria*, Guén., is about half an inch long, and spans one inch and a half or slightly more. The forehead, thorax, abdomen, and almost all the wings above, are green; the antennæ, a narrow line on the head joining their bases, two faint zigzag lines on both wings and the under side of the body, including the legs, are white, or whitish, while the costa of the forewings have a more or less rosy tinge. The pale border of the wings is extremely narrow. The moths frequent woody grasslands, and fly about October.

*Iodis*, sp. or var., much paler than the preceding, and without a vestige of the white zigzag lines on the wings, but rather wide pale fringe. This delicate species measures about three quarters of an inch to one and one-eighth, and appears to fly about April to May, a specimen having being caught on the first of the latter month in my garden at Norwood.

*Chlorochroma dischloraria*, Guén., is of about the same size as the last, the colouring very similar, and the green very intense. The head and costa of the forewings are rosy, the top of the head, the antennæ, *a line along the thorax and abdomen*, and the broad fringe whitish or with a rosy tinge. The fine white zigzag lines of the forewings, of which the outer one continues across the hindwings, are quite distinct. The insect is common in the Mount Lofty Ranges (Guest), and almost all wooded localities during spring.

*Chlorochroma* sp. (*cadmaria*, Guén. ?) resembles the last, but is very much smaller, the head and legs almost crimson, and with a round reddish spot in the middle of the hindwings. Balhannah.

*Comibæna* sp. ? This pretty moth spans about one inch and one-eighth, the body being stout and under half an inch long. It has grass-green wings with a white brown-speckled front margin, and a broad brownish band along the border, divided into two near the tip of the forewings, and including a green patch. The band shows darker spots, and along the border is marked with interrupted black and white lines. The underside of the body is white, of the wings pale greenish, with blackish streaks along the border of the forewings, a brownish patch along the apical third of the hindwings, and a smaller one in the hind angle of the same. The insect, apparently not common, was captured by Mr. Pullman at Summertown, in the Mount Lofty Ranges, about the middle of February. The specimen is too much abraded to attempt a more detailed description, and better ones are much desired.

Other genera represented in Australia are *Geometra*, *Nemoria*, *Thalassodes*, and *Chlorodes*.

The Mecoceridæ and Palyadeæ have both very long legs, in addition to which the latter have the wings marked with very bright metallic lines, absent in those of the former. The former inhabit West India, &c.; the latter India, with Ceylon and South America.

The Ephyridæ have the palpi well developed, the legs moderately long, and the hind tibiæ with two spurs. They occur nearly all over the temperate and warm regions of the earth, but it is doubtful if in Australia.

The Acidalidæ, mostly small moths, have weak legs and small somewhat abortive palpi. Mr. Meyrick appears to include them among the Geometridæ. They, in the typical genus, are well represented in Australia, and also in this province.

*Acidalia albocostata*, Walk., spans less than three-quarters of an inch, and the body is about one-third of an inch long. It is rusty coloured The narrow wings have some indistinctly wavy dark lines; that next the border is black, forming a series of dots, the border is paler, and somewhat toothed. The hind tibiæ of the female have no spurs. It is common in the Mount Lofty Ranges (Guest), and extends to New South Wales.

*A. recessata*, Walker, is slightly larger than the last, of a dirty whitish colour, and lightly sprinkled with black. The head is rusty brown, the top white, and the antennæ of the male bristle-like; the rather large pointed forewings have three indistinct darker lines, and a rather large spot in the middle. The species occurs about Balhannah

(Guest) and elsewhere in the Mount Lofty Ranges, and extends to New South Wales.

*A. rubraria*, Doubl., is pale greyish ochre tinted, with rather long palpi, black antennæ ringed with white, and shortly pectinate. The wings have a brown border and four toothed blackish-brown lines, of which the submarginal one is the broadest. Its habitat is the same as that of the last and extends to New Zealand. Besides these, there are a number of other species indigenous to South Australia and other parts of the continent.

*Timandra aventiaria*, Guén., differs generally from Acidalia by the hind tibiæ having four spurs instead of two, and is green or reddish, the wings having a pale rusty violet streak and white dots in the middle, a straight oblique rusty line bordered yellow, and a line of black points along the margin, besides other marks. Its habitat is Queensland.

The MICRONIDÆ have the forehead very narrow. A species, *Micronia defectaria*, Walk., white, with a black head, and across the wings three (mostly double) pale-grey oblique lines, and some streaks of the same tint near the border, also some additional marks on the hindwings, is reported from Queensland. The genus extend from Africa, through India, to Borneo.

The CABERIDÆ resemble the Ephyridæ, but have four spurs to the hind tibiæ instead of two, and poorly-developed palpi. The family, though only containing a few genera, extend from Europe to most other parts of the earth.

The MACARIDÆ have conspicuous palpi, the body not very slender, nor the forehead narrowed or very convex, and the wings distinctly angular. One of the four genera is well represented in Australia, extending from Europe to all the continents, with over 130 species.

*Macaria gratularia*, Walk., spans about one inch, and is whity grey, has bluntly-toothed velvety antennæ, and on the abdomen two rows of black points. The wings are speckled with black and brown, and have three lines, of which the outer one is black and nearly straight, the middle one brown and somewhat indistinct; the space along the border is purplish grey, and the lunules black. The somewhat rounded forewings have also a black mark near the posterior angle, and a reddish one near the tip, an interior black line and a kidney-shaped mark near the middle. Habitat New South Wales, and probably South Australia.

There are some more species in the latter colony, it appears, and two, much larger ones, in Tasmania, viz., *M. remotaria*, Walk., and *M. infixaria*, Walk.

*Halia australasia*, Guén., differs from the last genus in having the antennæ of the female toothed. It is reddish-grey, with the wings speckled, and the lines indistinct. The costal marks of the forewings are partly black, partly rusty with black edges, the discal marks reddish, edged black. The hindwings have a yellowish band near the border, and rusty streaks in the disk. The border is scarcely angulated. It is common in Tasmania, and probably also here.

The FIDONIDÆ form a very large family, with over 70 genera, of which some 12 genera, but especially the genus Panagra, are well represented in Australia with numerous species, though few yet have been identified with any certainty for South Australia. They are distinguished by lustrous wings, *not green*, moderately long legs, beaklike, compressed palpi, and satiny, pectinated, and feathery antennæ. They are distributed almost over the whole earth.

*Tephrina capitata*, Walk., is distinguished generically by nonincumbent palpi and the much incised or inflexed hindwings, and measures in length of body half an inch or more, and in span nearly one inch and a half. It is slaty-grey, with black head, the top of which and the front of the thorax yellow, as are also the palpi beneath. The wings are speckled with black, and have a black rim along the border. The sharp-pointed but not falcate forewings are tinged rusty, and have two yellowish white lines, of which the first is straight, the other wavy in the male, but scarcely so in the female. The discal mark forms an elongated ringlet. The hindwings are somewhat paler. Habitat, South Australia and Tasmania. Several more species occur in New South Wales and Queensland.

*Neritodes verrucata*, Guén., has extremely long legs, with four spurs, and the third joint of the palpi is short. It is pale yellowish-grey, the wings not speckled, the transverse lines formed of black points, and black marginal dots; the costa of the forewings dotted white, the hindwings wholly whitish. The forewings of the male have a wart-like swelling at the base. The moth is common about Balhannah (Guest), in the Mount Lofty Ranges, and extends to other parts of Australia, where it is endemic.

*Liodes* (Amelora) *leucaniata*, Guén., is testaceous grey. The forewings along the veins are streaked blackish, with white rays between, but no lines. Habitat, South Australia and Tasmania, where another species, *L. stilbiata*, occurs. The genus extends to Europe, and is distinguished by thickened antennæ. Common about Balhannah in March (Guest).

*Rhinodia rostrata*, Guén., belongs to another monotypic genus peculiar to Australia, and distinguished by neither of the wings being angular, but the forewings falcate. It is grey, the antennæ purplish-red, with white rings, the middle of the wings being marked by a shadowy curved reddish patch, and the exterior line almost obsolete. Locality uncertain.

The genus Panagra supplies 50 odd Australian species, as cited in Walker's Catalogue, of which only two or three can be quoted as examples. It is distinguished by sharp-pointed forewings, very long unfringed palpi, and pectinated antennæ in both sexes, and extends to Europe (?) and Africa in a few species.

*Panagra tricolor*, Westwood, is rusty-black, and the abdomen has broad yellowish bands. The forewings have a somewhat triangular yellowish-white band, and the hindwings are blackish, with a yellow discal spot.

*P. hypenaria*, Guén., is yellowish or purplish-grey, with a yellow head and extremely long palpi. The border of the wings is ornamented with blackish dots; the forewings have three interior blackish dots, an exterior straight oblique line, obsolete forward, and bordered black outside, and an ochre-coloured front margin. The species extends to New Zealand and Tasmania.

*Panagra confluaria*, Guén., is blackish-brown, the head and thorax striped white, the abdomen grey; the forewings have two whitish lines, with brown between, and white stripes near the costa; the hindwings are grey, with two whitish lines. It extends from Sydney to Tasmania.

*Selidosema penthearia*, Guén., is testaceous grey, and rather stout, with long slender tongue and pectinate antennæ. The wings are slightly speckled, the discal spot plain, but the cloudy brown patch in the middle scarcely conspicuous. The want of markings distinguishes the genus, which is chiefly European, but extends to Africa.

*Fidonia amitaria*, Guén., is clear brown, much resembling the European F. atomaria. The bands on the wings are interrupted with whitish speckles; the hindwings are yellow speckled, brown, and the medial line is also bordered with brown. Habitat in Australia uncertain.

*Speranza(?) fastidiata*, Walk., is a doubtful blackish species, yellow underneath, and the whitish forewings marked with four irregular brownish bands. Habitat, Queensland Usual character of genus absence of markings.

*Lythria(?) perornata*, Walk., spans over an inch, and is a very pretty Tasmanian species. The genus is distinguished by a slender velvety body and beaklike palpi, and chiefly at home in Europe and North America. It is of a bright ochre colour, with the head and front of thorax bright rosy, as is also the greater part of the border of the wings. The acute fawn-coloured forewings have three irregular bands and a line along the border deep purplish-red; the ochre-tinted hindwings have a blackish indistinct line in the middle, and another along the border.

*Catopyrrha (?) incrassata*, Walk., spans over an inch and a third, is grey, and the wings have a dark brown marginal line. The black speckled acute forewings have several white lines, some of which are double; the hindwings have the outer ones very faint. Habitat, South Australia. In this genus the lines of the wings are always curved and the hindwings not toothed. Two other species occur in North America.

*Aspilates (?)* sp. This little moth spans slightly over an inch, and is very common in the sandy and wooded district of South Australia. It is pale yellowish fawn, and resembles the European *A. citraria* considerably in the colouring of the forewings at a distance, excepting the absence of the inner band near the base, and of black speckles. The discal mark is very small, then follows a broad brownish band, much broader behind, diffuse on the inner side. The front margin is brown, and rather wide. The border is broadly brownish, with some very faint lines. The hindwings have scarcely any markings. There are several species of this genus in Tasmania, which also occurs in all the other continents, and differs from the preceding by the lines of the wings being straight, or nearly so.

The ZERENIDÆ, or Magpie Moths, form a moderately large family, distributed over all the continents, but poorly represented in Africa, and still more so in Australia. Beside their characteristic colouring, they are distinguished by short weak legs.

*Panæthia matudinata*, Walk., is bluish green, with the head and abdomen ochre-coloured, and spans nearly two inches and a half. The black-spotted thorax has an ochre-coloured spot at each shoulder. The wings have an ochreous border, and four incomplete ochreous stripes on each, a black spot in the middle, and eight bands of black spots. The discal spot and a broad dark band mark the underside. It occurs in Queensland, and, probably, the Northern Territory of South Australia. The genus is distinguished by the antennæ of the female not being pectinated, and the two-coloured abdomen. It extends to Java, Borneo, and S. America.

The LIGIDÆ, a small family of some seven or eight genera, of which one is endemic in Australia, but none extending to S. America, are characterised by a smooth porrect front, stout legs, and the absence of angularity in the hindwings.

*Chlenias Banksiaria*, Guén., spans over an inch and a half, and has long and rather narrow forewings, rounded at the tip. It is grey, the forewings much darker than the others, and crossed by several cloudy, whitish, and dark lines of spots and patches, the hindwings are more brownish, darker along the border, but without marks. The species occurs sparingly about Adelaide in wooded localities, a specimen was captured about the middle of June.

*Chlenias ariëtaria*, Guén., is of about the same size as the last, and of a brownish fawn colour, with numerous dark-brown streaks bordering the white veins. It varies exceedingly, and often presents transverse, very wavy white lines instead, which are separated by broad, brownish bands. The hindwings are silky, pale, and unmarked. The species is very numerous about Adelaide in April, and widely distributed. The caterpillars live on the young grass.

There are some eight or nine species described from other parts of Australia.

*Chlemeria cuneifera*, Walk., spans about an inch and a half, is pale greyish fawn, and has on the forewings several irregular lines formed of short black streaks on the veins, which are mostly white. The hindwings are whitish. Locality in Australia uncertain. The other species of the genus, *C. caligenearia*, Bamb., inhabits Corsica and S. France. Generic distinctions are the slender body, short proboscis, and long antennæ.

The Hybernidæ, a small European family of three genera, are mainly characterised by the almost entire absence of the proboscis, are of a moderate size, and apparently absent from Australia.

The Larentidæ form a large family of between 30 and 40 genera, some of which are very rich in species. Their body is slender, the proboscis conspicuous, and the flattened palpi sometimes beaklike when long. The antennæ are usually quite simple, sometimes those of the male slightly toothed. The abdomen is long, often banded or dotted with black points. The legs are smooth and slender, the hind ones with four spurs. The wings are smooth and silky or velvety, rounded and toothless; the first pair has usually more or less numerous undulating lines. Their chief distinction from Fidonidæ, which they resemble, consists in the antennæ never being feathery and seldom slightly toothed; from the Ligidæ in the slender legs.

The family is very well represented in Australia, there being described some twelve genera and 131 species in Walker's catalogue only, and these have been largely added to since. Only a few of these can be mentioned here.

*Larentia imperviata*, Walker, spans over an inch, and is grey. The palpi, as in this whole genus, have the third joint indistinct, and extend beyond the head, but are short in the species. The wings have a black festoon-like line along the border; the sharp forewings are speckled black, and have several blackish toothed lines; also two pale bands, speckled and lined darker, and a black discal point. The lines of the hindwings are indistinct. It occurs in South Australia, but nothing can be said of its habits. The genus contains over 80 species, and is found in all the continents.

*Microdes sitellata*, Guén., is blackish grey, with long straight palpi, and two pale bands in the forewings, the second of which is the larger, and divided by dots; the pale border lines are distinctly toothed. The genus, with only a few species, is peculiar to Australia and Tasmania, and characterised by the antennæ of the sexes being different.

The genus Eupethecia is also a very large one, being especially numerously represented in Europe, with over 80 species, but also occurring in Africa, India, North America, and New Zealand, besides Australia, from whence Walker cites three species. It is distinguished by usually small size, uncrested thorax, and narrow wings.

*Eupethecia testulata*, Guén., spans about three quarters of an inch, and resembles the European *E. pumilata* (E. pumilaria, Morris), only larger. It is grey, with numerous indistinct darker lines in the wings. The dentated lines in the forewings have the teeth mostly large; the two lines in the middle are close together, and the exterior ones much angulated. The middle lines in the hindwings are straight. Precise locality unrecorded.

Last year small caterpillars committed considerable damage in lettuce and cabbage beds. A single specimen was bred, and turned out to belong to this genus, but the species was not identified.

The small genus Sauris is characterised by the hind tibiæ having two spurs only, and the palpi *not* being thread-like; large eyes and long antennæ. Three species occur in Ceylon, one of which extends to New South Wales.

*Sauris remodesaria*, Walk., has a length of over half an inch, and spans nearly an inch and a half. It is dull green, with blackish undulating lines, grey bands, and streaks in the forewings. The hindwings are pale grey, the hinder part contracted and lobed.

*Polyclysta hypogrammata*, Guèn., is a brownish moth, with greenish forewings, speckled black; four brown bands, of which the three first are oblique and parallel, the fourth not. The hindwings are brown, with yellowish base, blackish medial band, and pale fringe. It appears to be the only species of the genus which is endemic to Australia.

*Coremia vicissata*, Guén. and Walker, measures about half an inch in length and nearly one inch and a half in span. It is from rusty to brownish red, the antennæ of the male toothed. The forewings have two grey bands, of which the first is interlined with black, and the other bordered; also a blackish marginal line, and a white discal mark with black dots. The hindwings are fawn-coloured, with white marginal lunules. The species extends to the neighbouring colonies and Tasmania. Some varieties differ considerably from the above, it appears.

*C. heliacaria*, Guén., resembles the preceding, but is a little smaller. The antennæ of the male have numerous, rather long bristles. The forewings are brown, with four whitey-yellow lines, the exterior ones very angular. The hindwings are dull brownish, and have the border marked by two brownish lines. It has almost the same distribution as the preceding.

The genus is a rather large one, extending over most of the countries of the earth, and represented in Australia and New Zealand by some two dozen species.

*Camptogramma strangulata*, Guén., is of wide distribution in Australia, extending to Tasmania and New Zealand. It is yellow, the wings fringed with rusty, of the latter tint are also the frontal margin (costa) and the oblique exterior band. The discal points are blackish and very small, the hindwings pale. Eleven species are recorded from Australia by Walker.

*Phibalapteryx* is a genus of moderate size like the last, chiefly European, but only from Africa it appears to be wholly absent. The four Australian species are thus characterised by Walker:—*Ph. strangulata*, Guén. (Tasmania), differs from the others by having the middle space of the wings dark; *Ph. rubraferrata*, Guén. (Tasmania), has long palpi, the others short ones; *Ph. perfectata*, Walker, has the border of the hindwings brown, which is not the case with the last.

*Phibalapteryx strixata*, Walker, is grey, with a reddish tinge, and spans about one inch and a third. The palpi longer than the head, and partly blackish; the much elongated narrow wings have three irregular black lines, which are very oblique, and a black point in the middle of the wing. The spaces between the lines are variously marked with grey, and the forewings besides have a pale line near the border. Its habitat is New South Wales.

*Scotosia scitiferata*, Walker, extends from New South Wales to Tasmania, and most likely also to the other colonies. The female is dark grey, and spans one inch and one third; the male brownish grey, and smaller. The palpi are separated from each other, very short and broad. The long wings are marked by many black lines, very oblique and nearly straight, three of which are rather wider, so as to form bands. There are several other species recorded from the continent, but more from New Zealand. The genus, larger than the last, occurs in all the other continents.

*Cidaria responsata*, Walker, is somewhat smaller than the last, and grey. The palpi are short, broad, and beak-like. The wings have blackish lunules along the border, and a whitish zigzag line near. The sharply-pointed forewings have five bands of blackish toothed lines, the three first on the inner side of the discal spot, which is black, and the others beyond it; also two whitish bands between. The brownish lines of the hindwings are very indistinct. Habitat, South Australia. This large genus of about a hundred species is as widely distributed as the preceding. Of these Australia has more than a dozen, New Zealand over twenty.

The following families appear to have few or no representatives in Australia:—

The Eubolidæ resemble the Ligidae in not having the hinder angle of the hindwings produced and in having stout legs, but differ in *not* having the front of the face extending forward. They only embrace some five genera, all chiefly European, only a few species extending to some other continents.

The Sionidæ embrace some ten genera, all small, several monotypic, and mostly endemic to one or other country. They are distinguished by having the border of the hindwings near the inner angle considerably extended and tail-like.

The Hedylidæ form a small American family of some four genera, and are distinguished by a conspicuous proboscis, semihyaline forewings, simple antennæ of the female, and very slender body. The genera have only one or two species each.

The Erateinidæ, another very small family of two genera, of which the typical one contains some sixteen species, but the other only one, are endemic in the tropical parts of South America. The chief character consists of the semitransparent markings of the forewings.

The Emplocidæ, co-inhabiting the same regions as the last, are chiefly distinguised by the abdomen of the members of the only genus being marked with two colors. Much resembling the *Nyctemeridae*, Walker suggests their transference to that family.

The Hypochrosidæ embrace two genera, *Hypochrosis* and *Achrosis*, inhabiting India and Borneo, of which the first has about five genera, the other only one genus. They have a conspicuous proboscis and palpi, a not very slender body, and the antennæ of the *female* conspicuously pectinated or comblike.

This concludes the account of the Geometrites, and also, with them, that of the Macro-lepidoptera, or large moths.

## MICRO-LEPIDOPTERA.

The Micro-lepidoptera, or Small Scaly-winged Insects, are so called in contra-distinction from the others on account of the very small size of the very large majority, and out-number the "Macros." considerably in species, but their small size and mostly sombre colouring render them for all, except the student of nature, very inconspicuous. However, in many cases they succeed in enforcing the attention of much wider circles by the damage various species commit, not only among growing plants, such as grasses, vegetables, garden flowers, and fruit, and forest trees, but also among garnered grain, dried fruit, raw and manufactured fur, woollen goods, herbaria, &c., for there is scarcely anything within the animal and vegetable kingdoms that the larvæ or caterpillars of some kinds will not avail themselves of as food, and cause loss and destruction in unexpected quarters.

According to Kirby (1882) 5,284 species of Lepidoptera are known in Europe, of which over 3,000 are "Micros." Of about 1363 species of Australian lepidoptera recorded by Walker in the British Museum Catalogue, 423 belong to latter, which numbers, by comparison with the preceding, at once bear witness to the great incompleteness of knowledge regarding Australian butterflies and moths at his time, which has been considerably amended since by Meyrick and others, but still offers a wide field of research, especially in respect of the "Micros" and their habits.

Our space and aims forbid entering into any lengthy descriptive detail so far as this division is concerned, which must be deferred until local knowledge is much farther advanced than at present, and only a short general description of the larger divisions and a few well-known species can be offered in conclusion of this series of papers.

The Micros, as they are called by collectors for the sake of brevity, are distinguished by thread-like (filiform) or bristle-like (setaceous) antennæ, which are as long or longer than the slender body, which is frequently extremely minute. The wings are very narrow, the anterior and posterior margin more or less parallel, and the latter, as well as the border, deeply fringed with hairs; at rest they are either placed at a roof-like slope or rolled around the body. The hind tibiæ have four, usually long, spurs, and do not extend beyond the body in some cases.

The tiny larvæ have mostly sixteen legs, the normal number, but there are some with only fourteen, and others with eighteen legs; they are either quite smooth, or more or less covered with bristles, and mostly live concealed within their food-substance (Potato Moth, Codlin Moth), or spin for themselves a protective covering (Clothes Moth), with which they traverse their empire, or form silk-like galleries and tunnels among the leaves of the plants they live upon (Hakea Moth). Many species find protection and sustenance between the upper and lower epidermis of the leaves of many plants, where they tunnel tortuous galleries or almost separate the two surfaces entirely (Mining moths), thus destroying the leaves as effectually as the larger kind, which devour them bodily, and are much less easily dislodged or killed. When mature, they come out and spin elsewhere a silky cocoon, within which they change into the chrysalis. The smallest species are about one-eighth of an inch span; the largest measure about one inch to one inch and a half.

The principal families are the Galleridæ, Phycidæ, Crambidæ, Tortricidæ, Tineidæ, Pterophoridæ, and Alucitidæ, of which the Tineidæ are divided again into some twelve sub-families by Walkers, and into some thirty by Kirby and others.

The Galleridæ form a small family, distinguished by the large maxillary palpi much extended, and the labial ones shorter than the head and recurved. The larva of several European species are notorious for feeding upon the wax in beehives, in which they form long tortuous tunnels. The moth are rather stout, and among the largest of the Micros. *Achrœa grisella*, Meyrick; *Egone bipunctalis*. Walk., New South Wales. The wings of the moths of this and the following two families are long, the anterior ones narrow, the posterior ones broad, and folded round the body when at rest. Palpi, antennæ, legs, and abdomen are long, and—except the first—also slender.

The Phycidæ, or Knot-Horn Moths, are so called on account of being provided with a tuft of hairs near the base of the antennæ, which at rest are laid along the back over the wings and end in a fine point. The labial palpi are longer than the head, extending much beyond it. The forewings are frequently almost elliptical in outline, and the border much rounded. Walker (Brit. Mus. Catalogue) records 28 species from Australia, of which two only are cited from South Australia. The larvæ live frequently among leaves of various trees, but feed either upon unripe or dried fruits. *Phycis elutella*, Huebner, is notorious on account of its larvæ feeding upon dried apples, plums, dates, &c., and sometimes causes great havoc among the fruit in the cases. It is often found among imported fruit of this description. Europe, but extending almost over the whole earth.

*Homœsoma vagella*, Zeller, spans about three-quarters of an inch; head and thorax are ashy grey, the abdomen pale; the forewings are also ashy, finely sprinkled with brown and some short blackish streaks. The hindwings are satiny whitish, with a very narrow brown line at the base of the fringe. This species, as well as all the following ones, has been captured in the neighbourhood of Balhannah, in the Mount Lofty ranges, by Mr. E. Guest, who has presented the named species to the Museum. It flies in December.

*Etiella Behrii*, Meyrick, spans less than an inch, and is grey. The forewings have a silvery white stripe along and close to the costa, except near the middle, bordered broadly dark brown behind; the veins in the remainder of the wings are finely marked with dark brown. The hindwings are grey, with a slender dark and pale line along the border. It flies in November and December, and is common in the Mount Lofty district, though regarded elsewhere as scarce (Guest, MSS).

*Zophodia ensiferella*, Meyrick, spans about one inch, the brown forewings are narrow, and showing lighter and darker tinges according to the angle the light is reflected. The hindwings are blackish. December.

The CRAMBIDÆ bear the bristle-like antennæ in repose *under* the wings, their long labial palpi are stretched out forward like a trunk. Their larvæ live mostly inside of the stalks of grasses, reeds, &c. The Moths sit usually head downward on grasses, hence they are also called Grass-moths, and, when disturbed, fly but a short distance, rolling their wings in the smallest possible compass when settling, so that they seem to disappear suddenly. The family is a moderately large one, and distributed widely.

*Somnoceros crambella*, Meyrick, spans about one inch and one-eighth. The antennæ, head, and thorax are white, the latter with slender dark lines along the sides and middle. The forewings, which are rather acute and the border nearly straight, have the margins nearly parallel, are whitish, and have a broad dark brown stripe along the first two principal veins, and very narrow dark lines on all the others. The hindwings are pearly or silky white, finely striped near the border. The abdomen is greyish, banded darker. November.

*Thinasolia gramella*, Meyrick, is of nearly the same size as the last, pale yellowish, with a rather broad darker stripe from the middle of base to the tip, accompanied by a fine dark brown line which, however, ends in the middle of the border; all the veins dark near the latter. The hindwings are paler, and without marks.

*Thinasolia* (Crambus ?) *relatalis*, Meyrick, similar in size to last, is yellowish brown, with a rather broad, silvery white stripe parallel to the costa, another along the third main vein and branching into three near the border, and a fine one along the hind margin, there is also a short white band near the border, a dark line along it and another, parallel in the fringe. The hindwings are pale, darker about the border, and have white fringe. "Very common in February and March" (Guest, MSS.).

The TORTRICIDÆ, or Bell Moths, are distinguished by thread or bristle-like antennæ, not longer than the body (but often shorter), a tuft at the apex of the abdomen of the male, and the border of the rather broad forewings strongly emarginate (something like ⌒), and not deeply-fringed wings. The latter are worn loosely rooflike in repose. The larvæ are usually pale coloured and slender, have 16 legs, and live mostly in rolled-up leaves, &c. (hence the name, which means Twister or Roller). When disturbed they prove themselves very agile, by rushing out at either end, and walking backward or forward, letting themselves down by a silky thread out of harm's way till the danger is past. Some inhabit the interior of fruit, &c., like the well-known Codlin-Moth (*Carpocapsa pomonana*, L.), the Plum Moths (*C. nigricana*, and *C. funebrana*, F.), &c.

Many of the species are notorious for the great destruction they cause in coniferous and other forests, and also in orchards. The moths fly by day only, when disturbed, but habitually in the early evening or night.

*Dichelia isoscelana*, Meyrick, spans about three-quarters of an inch. Head and thorax are dark-brown, with some yellow marks. The forewings are paler brown, with a broad dark-brown semicircle at the hindmargin near the base, a similar very oblique band through the centre, to which is joined by a short slender stalk an oval dark spot at right-angles, the included triangle being whitish, and a dark patch near the border; all the lighter spaces are marked by fine, short transverse lines, slightly darker. The hindwings are light grey, darker towards the borders. October.

*Cacœcia lignidana*, Meyrick, spans five-eighths of an inch, and is very pale grey, the forewings slightly darker, without conspicuous markings. November and December.

*Tortrix (Conchylis) subfurcatana*, Walker, spans three-quarters of an inch. The head and the front and sides of the thorax are yellowish-grey, the remainder of the latter and the abdomen are dark-brown. The forewings are brownish near the base, very dark-brown the remainder, with nearly equidistant whitish bands, the second and third slightly oblique and tortuous. The hindwings are dirty pale-yellowish near the base, and the remainder blackish grey. September and October, along river banks.

*Scolioplecta comptana*, Meyrick, is somewhat larger than the last. The face and shoulder tufts are pale the thorax black, with a narrow whitish oval ring above, the abdomen reddish-brown, banded blackish. The forewings are brownish, with small black spots and transverse black markings; also three whitish, slightly curved, and irregular transverse bands, of which the last is near the tip, forked and incomplete. The hindwings are reddish-brown mostly, but with a blackish tinge over a considerable area near the tip. December.

*Acropolites signigerana*, Meyrick, is considerably smaller than the last, and ashy grey. The forewings have two dark oblique band-like patches, of which the exterior one is much broken, also numerous darker dots. The hindwings are paler, with a fine white and a dark line along the border. "Common in December and January" (Guest, MSS.).

*Carpocapsa conficitana*, Walker, a congener of the notorious Codlin Moth, inhabits Queensland, and *C. trajectana*, Walker, New South Wales, according to Walker, (Brit. Mus. Cat., pp. 412, XXX., 992). Whether these have similar habits, or colouration cannot be stated, as there is no information regarding the former on record, nor have specimens been seen.

*Heliocosma incongruella*, Meyrick (Conchylidæ), spans three quarters of an inch, and is pale whitish grey. The forewings have the hindmargin very much emarginated and a broad dark brown band across it, which is parallel with the border, and adjoined by several white marks on either side; also some pale brown spots near the border. The hindwings are whitish without marks. December.

The Tineidæ, Tineites, or Tineæ, are generally of very small size and very slender structure, they have very long, narrow wings, fringed very deeply, but not wrapped round the body, and simple antennæ. Other characters vary so much, that they have been divided into a large number of families, or sub-families, but as our space does not admit of entering into details, only a few species will be described, to give a general idea of their appearance. The larvæ live upon almost any organic substance, living and putrid, according to the habits of the various species. They have usually 16 legs, but occasionally 14 or 18, are mostly pale, living as they do inside of their food substance, or in a case, if outside, and are therefore seldom seen, unless occurring in great number and occasioning loss.

The moth fly by night, and are then much attracted by the light; some species, like the Corn-Moth (*Tinea granella*, L.), of Europe, and the Australian Potato Moth (*Lita solanella*, Boisd.), scarcely leave the food-substance from which they emerged, but mate, lay eggs, and die, until all the supply is exhausted.

*Palparia aurata*, Walker (Œcophoridæ), spans nearly one inch and three-eighths. Head, thorax, and forewings are of a warm paler or darker orange tint; the frontal margin of the latter is very convex, and the tip acute to falcate; the costa and hind margin, as well as the main middle vein, are narrowly crimson or purplish, and border more broadly of the same tint. The hindwings are of a pale golden yellow.

*Chrysophasa pultenææ*, Lewin (Cryptolechidæ), spans from over an inch (male) to nearly two inches, is therefore one of the largest of the Tineæ, and is white, the forewings with a number of black dots along the border.

*Chalarotoma parabolella*, Meyrick, spans fully one inch. Head, thorax, and hindwings are dark grey, the forewings satiny white, with two orange stripes, joined at and converging from the base, then parallel, and connected near the border by a bar parallel with it. "On the catkins of Banksia in November" (Guest, MSS.).

*Chalarotoma*, sp. Smaller than the last. Forewings satiny white, with a broad coppery-brown stripe parallel to costa broader at the tip, joined by two short bars from the margin sloping forward, and two long bars posteriorly sloping backward, and joined by a short obliquely stripe along one of the inner veins; along the border is also an equally broad band scolloped on the inner side; the fringe is white. The hindwings and abdomen are grey.

*Heliocausta enselma*, Meyrick, spans about one inch, and has a comparatively stout body. Head, thorax, and forewings are of a light reddish (or purplish) brown; the latter have a broad diffuse, slightly oblique darker band in the middle, diffuse oblique stripes near the base, and a narrow wavy line midway between the band and the border. The hindwings a pale yellowish, with the fringe a little darker near the tip. Common about January to March on Eucalyptus rostrata (Red-gum—Guest, MSS.).

*H. elæodes*, Meyrick, span seven-eighths of an inch, and very pale yellowish grey; the forewings have a dark rosy brown curved band along the border, and a small, similarly tinted but paler patch about the middle of the hind margin, and a minute dark dot or two at the apex of the discal cell. Hindwings paler. Common in the larval state from December to March, but not seen on wing (Guest, MSS.).

*H. paralyrgis*, Meyrick, is somewhat larger, head, shoulder tufts, and wings golden yellow; the thorax purple, and the abdomen, except the yellow terminal tuft, brownish or blackish. The forewings have a broad rosy band along the border and part of the posterior margin, the inner outline very sinuous. The hindwings have a brown blackish fringe shading into paler towards the hind angle. The males of all the species are always smaller than the females. On Eucalypts about December and January; the larva spins two leaves together into a case, in which the chrysalis state is passed (Guest).

*Hopletica repandula*, Meyrick, is pale fawn with a rosy tinge, the hindwings grey, and of about the same size as the last. Common in December and January (Guest).

*Cerythopla melanota*, Meyrick, spans over an inch, head, thorax, and forewings black, sprinkled much with white; the fringe alternately dark and pale. The hindwings are pale brownish grey, with a pair of fine dark and white lines along the border.

*Philobata* (Œcophoridæ) *agnesella*, Newman, is much smaller than the last, pearly white, the forewings with a pale narrow brownish stripe above the sub-costal vein. Very local in habit. October. (Guest).

*Ph. arabella*, Newman, spans an inch and one-eighth. Head, thorax, and abdomen are more or less blackish brown. The forewings have a broad black stripe terminating acutely at two-thirds of the costa, which is bordered narrowly with white; the basal area, with a nearly straight, abrupt exterior outline, and the border area, with a semicircular inner one beginning at the second vein near the tip, are blackish grey, the remaining discal space golden yellow. The hindwings are of a similar and uniform tint with the border and base of the forewings. The male is about half the size, blackish grey, and the discal area silvery and of modified outline. Very common from October to December (Guest).

*Ph. auriceps*, Meyrick, spans three-quarters of an inch. Head, body, costa near tip, and border of the forewings and the hindwings are blackish, the remainder of the forewings of a uniform satiny dull green. November and December.

*Ph. bimaculella*, Newman, is larger and has much broader wings than the last. The forewings are pale whitish yellow, with a broad, somewhat irregular band in the middle and a broad border both blackish. The body and hindwings are brownish grey. December.

*Ph. pantinella*, Newman (?), spans scarcely three-quarters of an inch, and has narrow, white forewings with an interrupted blackish stripe along the posterior margin and the border, also a few minute blackish marks in the disk. The hindwings are dark brownish grey. September and October.

*Ph. toxulea*, Meyrick, has broad, rather short, fawn-coloured forewings and blackish hindwings. The male spans nearly an inch, the female is larger. November and December.

*Ph. vibella*, Meyrick, is considerably over an inch in span; the forewings are dark grey, with some black dots in the disc and along the border, also some indistinct, dark tortuous transverse lines. The hindwings are paler. November and December.

*Ph. pretiosella*, Meyrick, spans an inch and one quarter, and has long narrow wings. The forewings are satiny white, narrowly black along the costa, and a rather bright red stripe along the subcostæ (or first main) vein to the tip, where it curves round and is continued along the border, gradually fading into brownish; the fringe is also red; the colour is also continued across the thorax in front; the hind part of latter and the head are fawn. September and October. The larva of some, or all, of the species of this genus live in tortuous tubes enveloping the leaves of Hakeas and other shrubs, in which also the chrysalis stage is passed.

*Thudaca obliquella*. Walker, spans three-quarters of an inch. Head and thorax are rosy fawn, the abdomen greyish, as well as the hindwings. The forewings are satiny white, parallel with the costa, and the hindmargins are fawn coloured stripes, connected by two oblique parallel bands, bordered dark on the inner side, a narrow dark line along the border and the yellowish fringe complete the ornamentation. September; another brood in January (Guest).

*Eochrois protophaës*, Meyrick, is not much over three-quarters of an inch in span, pale rose grey, the forewings with a dark fringe and border, and two minute black dots in the middle. The hindwings are pale greyish. January; rather scarce. It has been surmised that the caterpillar attacks grapes, and damaging them by feeding on the stalks under shelter of the berries, and causing them to wither and spoil.

*Lita solanella*, Boisduval, the Destructive Potato Moth, spans about five-eighths of an inch, or less, and is not much over one quarter long, but notwithstanding this small size, costs the country annually many hundreds of pounds, as the larvæ notoriously destroys large quantities of potatoes since many years. The following description is extracted from a paper by the author published in the Transactions of the Royal Society, S. A., vol. IV. (1880-81), p. 57, to which the reader is referred for fuller details. The colour is a brownish grey of various shades. The face is almost white, the eyes large, dark-brown; palpi longer than the head, the middle joint hairy;

antennæ as long as the body. The forewings are straight and narrow, border rounded; those of the female brownish-grey, with minute black and white specs forming indistinct transverse lines, of the male clearer brown; the black points form a semicircle on the posterior margin, and a small ocellated slot the extremity. The hindwings are silvery bluish white, the very long fringe brownish. The legs and underside of body are white. From breeding experiments conducted in 1880-1, and subsequent observations, the following facts were elucidated:—The moths appear first about the end of December, and deposit their eggs either upon the withering potato stalks or on the tubers, if they can get at them, when left out in the field. In a few days they hatch, the larvæ boring directly into the tubers, forming a slight protuberance, and form tortuous tunnels, and attain full maturity in about six or seven weeks. They are then rather more than half an inch long, and one-tenth in diameter in the middle, tapering both ways, the posterior part terminating in an acute point. The head is dusky with strong black mandibles, the remainder about dirty greenish grey, each segment with a very faint pink transverse bar; below the colour is of a faint pinkish tinge. At this stage they leave their tunnels and spin a partial cocoon in the angles of a box, etc., within which they change into the chrysalis, from which the perfect insect emerges in about 16 to 17 days. The moths are strict night fliers, and scarcely are ever seen, except in the immediate neighbourhood of their food. Here they pair, and brood succeeds brood as long as any moisture is left in the putrid mass, into which the tubers are gradually converted, and although the outside thereof may be dry and shrivelled up. The moth themselves appear to partake of the same kind of food as the larvæ, as they lived for several weeks in confinement, and therefore probably laying their eggs singly during this period, which seems to be confirmed by the almost continuous appearance of fresh moths from only four small potatoes, from the 22nd of December until the end of January, during which time several scores were obtained. At a subsequent occasion it was found that potatoes unearthed before the second week in January remained for seven months free of attack, when the last were consumed in the ordinary way, while those in an adjoining field and left till the middle of February were very badly affected two months later. This points an important moral, viz., dig out the tubers as soon as ripe and secure in tight bags and a clean (*i.e.*, whitewashed) storeroom. Affected or rotten tubers should be boiled, burnt, or drowned, not thrown on the dung heap.

The Destructive Potato Moth is stated by Meyrick (Trans. Linn. Soc., N.S.W., Vol. IV, 1879) to be a native of Algeria, &c., and therefore introduced, which the author considers to be very probable, the tubers being free of this plague in the early years of the colony, *i.e.*, before 1855. The name is also from Mr. Meyrick, and, if correctly determined, belongs to the large family of the Gelechidæ among the Tineæ.

The genus *Adela* embraces moths with very slender antennæ, exceeding the body considerably, sometimes twice or more, in length and often brilliant metallic colours of the fore wings. A species was numerously observed at moist localities in Kangaroo Island during September and October.

The NEPTICULIDÆ include the smallest lepidopterous insects known—one eighth of an inch in span—and are all leaf miners.

The PTEROPHORIDÆ or Plume Moths have the forewings divided into two and the hindwings into three plumelike, deeply fringed partitions. The caterpillars are smooth and have sixteen legs. The species *Pterophorus pentadactylus* has been observed in South Australia. It is also a European species, and its larvæ live on Convolvulus species. It is quite white, and when flying resembles some thistle down floating with the wind. The genus *Agdistis* has the wings undivided, but is smaller than the above, which spans about one inch. There is one species, it appears, in South Australia.

The ALUCITÆ resemble the above, but the wings are divided into six plumes each. Both these families are very small.

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